PACKAGE engineering

Plastic films don't block heat transfer

Close study of heat penetration rates into packages shows that you can interchange films without altering heating time—since the thermal resistance of typical plastic films tested is negligible. (See Page 33)

Split-level line: asset, not liability

Developing a vertical transfer of empty bottles from basement storage to a packaging line one floor above shows that the concept of a three-dimensional, U-shaped line is workable and should induce refinement. (See Page 38)

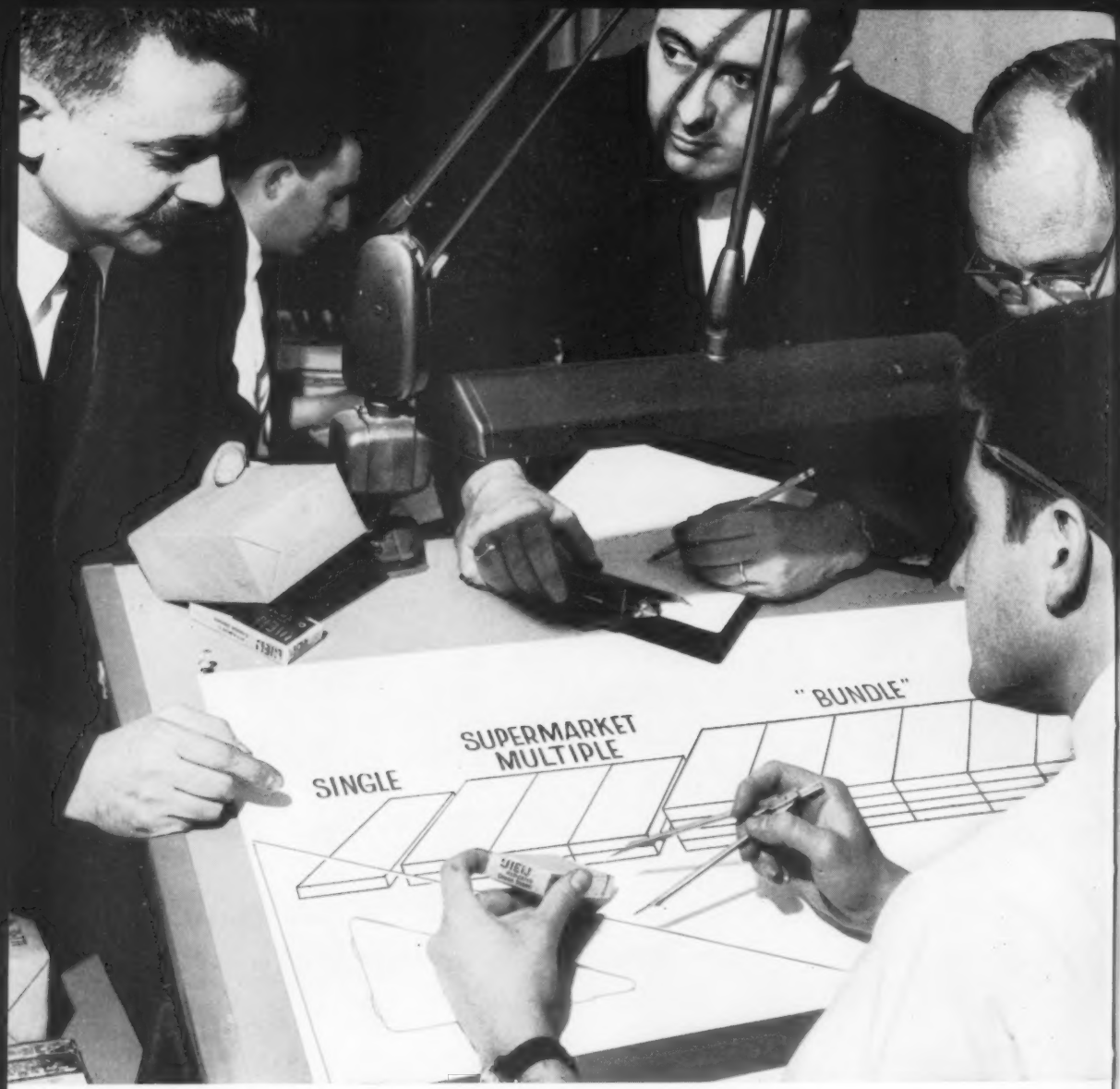
How machines cause material stresses

Three German researchers, seeking ways leading to better performance and machinability, report some answers to problems of just what properties packaging materials need to withstand the stresses caused by machinery. (See Page 42)

Complete table of contents on Page 2

JULY 1960

VOLUME 5 • NUMBER 7



Save up to 80% on packaging costs with a free analysis by Scandia

Call or write Scandia today to find out how modern "bundling" can bring you savings and improved packaging.

You can save up to 80% *on materials costs alone* with Scandia Bundling Machines using either film or Kraft paper to overwrap distribution packages of 12 or 24 retail units. Hand-filling of display containers is eliminated, too. And cost of warehousing packaging materials inventory is sharply reduced.

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Aluminum Foil Packaging—Prevention of Frozen Food Dehydration

One of a Series of Reports by Reynolds Metals Co.

"Freezer burn", a type of desiccation in frozen foods, is a serious problem facing packers, retailers and consumers alike. Resulting deterioration in quality, depending upon the degree of freezer burn, may include: objectionable appearance, irreversible dehydration of proteins, dryness and toughness in food tissues, and oxidation and rancidification of fats underlying dehydrated areas. The problem is particularly acute in products which tend to leave air-filled voids within a package, such as meats, poultry, fish, vegetables and certain prepared foods.

Laboratory tests show that package design and material can have a profound effect on this dehydration of frozen foods and that aluminum foil packaging offers exceptional protection.

Cut Moisture Loss

Aluminum foil packages have proved their ability to maintain contents at lower temperatures in transit and storage (See Reports No. 5 and No. 9). This indicated lower thermal energy content, of course, results in lower rates of evaporation or sublimation of contained moisture.

Dehydration is a serious factor even with frozen liquids which have no initial air spaces between product and package. As moisture is lost the product shrinks and leaves a space between itself and the package with subsequent further dehydration and oxidation. The extremely low water vapor transmission rate of aluminum foil packages is particularly effective for minimizing dehydration.

Besides protecting against voids caused by shrinkage, aluminum foil —with its ability to conform intimately to irregular shapes—can largely eliminate pockets of trapped air which occur in the packaging of large irregularly-shaped products such as poultry.

The higher thermal conductivity of aluminum provides more uniform and more rapid freezing. The uniformity of freezing reduces the possibility of localized warmer and colder areas within the product, which have been found to accelerate freezer burn. And the faster freezing results in the formation of smaller ice crystals which do not rupture food cells as readily as larger ones. This permits greater retention of moisture by the sound cells.

Halves Freezing Time

Fig. I shows the time required to reduce the temperature of packaged peas to 0°F in an air-circulated freezer at —10°F. Note that the contents of the aluminum foil package required approximately half as much time as the others to reach 0°F. In plate freezing, which is much faster, the same ratios of time are obtained. Fig. II illustrates in another way the ability of aluminum foil to reduce the dehydration of frozen foods. Because of vapor pressure differentials, frozen moisture tends to be drawn from the food itself and to form ice crystals within voids or cavities in the package. The graph shows the amount of this "cavity ice" formed in packaged frozen green beans stored at —10°F. It is to be noted that this formation, which is a measure of the dehydration, is greatest in the earlier months of storage and that it was two to three times as heavy in the non-aluminum packages.

For further information on this or any other phase of aluminum packaging protection, call your local Reynolds representative. Or write to **Reynolds Metals Company,** Richmond 18, Virginia.

©1960 by Reynolds Metals Co.

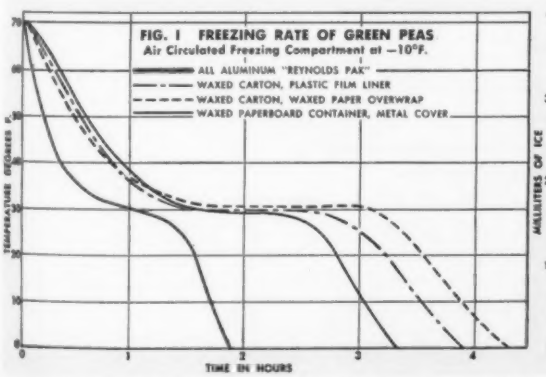
FIG. I FREEZING RATE OF GREEN PEAS
Air Circulated Freezing Compartment at —10°F.
ALL ALUMINUM "REYNOLDS PAK"
WAXED CARTON, PLASTIC FILM LINER
WAXED CARTON, WAXED PAPER OVERWRAP
WAXED PAPERBOARD CONTAINER, METAL COVER
TEMPERATURE DEGREES F.
TIME IN HOURS

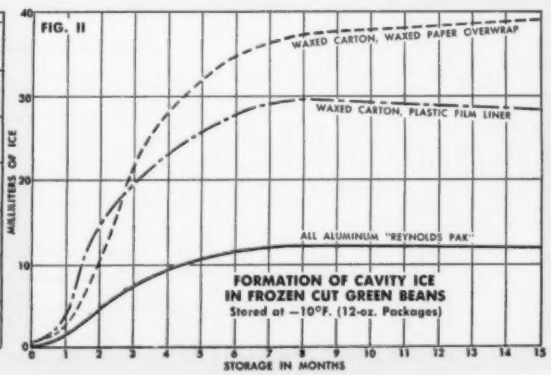
FIG. II
WAXED CARTON, WAXED PAPER OVERWRAP
WAXED CARTON, PLASTIC FILM LINER
ALL ALUMINUM "REYNOLDS PAK"
FORMATION OF CAVITY ICE
IN FROZEN CUT GREEN BEANS
Stored at —10°F. (12-oz. Packages)
MILLILITERS OF ICE
STORAGE IN MONTHS

Watch Reynolds TV shows: "BOURBON STREET BEAT" and "ADVENTURES IN PARADISE"; and, resuming in October, "ALL-STAR GOLF"—ABC-TV.

JULY 1960 • VOLUME 5 • NUMBER 7

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

For your calendar

July 19-21. Western Packaging and Materials Handling Exposition:
Pan Pacific Auditorium, Los Angeles. Contact: Clapp and Poliak, Inc., 759 Monadnock Building, San Francisco 5, Calif. *Telephone: DOuglas 2-7876.*

August 15-19. AMA workshop seminar on package development and engineering:
Colgate University, Hamilton, New York. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

September 14. Packaging Institute professional member seminar on folding cartons:
Drake Hotel, Chicago, Ill. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

September 21-23. AMA workshop seminar on packaging costs and controls:
Hotel Astor, New York, N.Y. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

September 28. Packaging Institute professional member seminar on resins:
Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

October 31-November 2. Packaging Institute 22nd Annual National Packaging Forum:
Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

October 31-November 4. AMA packaging management course:
Hotel Astor, New York, N.Y. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

1961: November 7-10. Packaging Machinery Manufacturers Institute Show of 1961:
Cobo Hall, Detroit. Contact: W. L. Redding, Hanson & Shea, Inc., One Gateway Center, Pittsburgh 22, Pa. *Telephone: ATlantic 1-8552.*

Articles

33 **Heat penetration into plastic packages for heat-processed foods,** by R. C. Wornick, United Fruit Company, and Marcus Karel and B. E. Proctor, Massachusetts Institute of Technology
Experimental study to determine what resistance flexible plastic materials have to the rate of heat transfer to the inside of a plastic package.

38 **Split-level packaging line saves space, hikes efficiency,** by Leland R. Srigley, Director, Industrial Engineering, Parke, Davis & Company
Using multi-story building to advantage—vertical elevator moves packages between unit packaging on one floor, and case loading and storage on another.

42 **Packaging machines cause mechanical stresses in flexible materials,** by H.-E. Roder, Farbwerke Hoechst A. G., Frankfurt, Germany, and Rudolf Heiss and G. Schricker, Institute for Food Technology & Packaging, Munich, Germany
Part I—Tube-forming and creasing processes in bag machines—of a three-part article discussing material properties necessary for good machine performance.

58 **Adhesive sealing problems—spelled out and cured,** by Harvey Miller, Manager, Technical Service Department, Morningstar-Paisley, Inc.
Pointers on use of packaging adhesives to gain optimum performance—including handy reference chart of common sealing defects, their causes and cures.

70 **Using large packages without a packaging line**
How The C. P. Hall Company of Illinois uses a non-standard package—with only minor changes to its operation—to answer the needs of one of its customers.

74 **Large tubes supply corks continuously,** by Charles R. DeSpain, Vice President and General Manager, Heaven Hill Distilleries, Inc.
Plastic tubes connect supply room hopper to corking machines on floor below —no supplies on bottling room floor; corkers never run out of corks.

76 **Western packaging show in Los Angeles**
Information on the forthcoming 1960 Western Packaging and Materials Handling Exposition—dates, hours, advance registration.

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Reader Service Cards inside back cover

Our December, 1960 issue will carry a cumulative editorial index for the year, listing our feature articles by subject, author, and other headings.

GOODYEAR

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In all Daitch Shopwell outlets, too, coffee is now marketed the modern efficient way—preground and prepackaged in bags lined with PLIOFILM.

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A note from the Publisher

Let's sell packaging as a career

A month or two ago it was suggested in this column that the cause of packaging might be helped if its importance were to be recognized through more cash awards for suggestions on improving the packaging operation; and publicizing these awards to alert and interest more men in a career in the packaging field. Is it not the responsibility of all of us who are in the industry to emphasize the present and ever-increasing importance of packaging, and to sell it as a career?

While you are reading this, most of the June graduates already will be at work in industry, and the personnel recruiters will turn their thoughts to the next crop of graduates—but how many young men have come into your business with the expressed purpose of a career in packaging? In many cases, the value added to a product by packaging is larger than the value added by processing the raw material into the product that goes into the package. In every case, the degree of profit that a company makes can be greatly affected by the skill with which the men in packaging select the package and packaging material, and how effectively they utilize the best available packaging machinery.

In spite of the tremendous importance of packaging to a company's profitability, there are far too few young men who at the outset of their career choose this phase of business.

Not everyone can be a recruiter, nor does everyone have the opportunity to talk to graduates with technical and engineering backgrounds, but everyone can sell the importance of packaging to people in his own company and to his personnel director.

If your company publishes a house organ, for instance, why not urge the editor to run a section each month on the activities of packaging people in your company? Let your young men in packaging attend the packaging shows or the Packaging Institute meetings which are now held in many sections of the country throughout the year. These activities will make employees more aware of packaging's importance and impact, and, consequently, will attract more able men into packaging.

Today's increasingly complex field of packaging, with literally hundreds of packaging materials to choose from to do any given job, requires more men who are technically trained. Everyone is aware that, if his business is to stay abreast of competition, let alone surpass it, it is imperative to have technically trained men managing the packaging operation.

The various educational efforts in packaging need and deserve our encouragement and support. Not only are they promoting packaging as a career, but they are training the manpower needed to make this industry even greater than it is now.

Angus J. Ray

Publisher

PACKAGE engineering®

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BPA

OUR JOB IS TO GIVE YOU BETTER BOTTLE LABELING

One of the main reasons for using glass containers is eye appeal—translating itself into sales appeal. Having acquired eye appeal for your product, you can't afford to gamble with your label—your product identification. That's why your choice of label adhesive is of vital importance.

Any good label glue of any recognized supplier will stick—that's fundamental. And our glues are up front on this score.

However, Morningstar-Paisley is concerned with more than just sticking. We're concerned with building extra qualities into our bottle labeling glues. Like . . .

ease of machining . . . short breaking characteristics, to give clean machining without stringing . . . the ability to roll out to thin, continuous film—for strength and economy . . . quick tack to operate with today's continuous motion machines . . . stability over a wide range of temperatures and physical conditions.

There's no reason for any manufacturer to worry with label adhesive problems. M-P "shirt-sleeve" salesmen—our Technical Service Men—are trained and experienced in solving your problems and preventing new headaches from occurring. We welcome the opportunity to discuss your requirements at your convenience.

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The PULSE/of packaging

Groups in the news:

"Management should see that packaging engineers have a voice in improving product design," Maj. Gen. Dan F. Callahan, USAF, told those attending the SOCIETY OF PACKAGING AND HANDLING ENGINEERS national competition awards banquet. Noting that packaging and handling engineers need to know as much about an item as its designer, Gen. Callahan urged management to place greater emphasis on the packaging engineering and materials handling areas. Reminding his audience that application of scientific principles will sharpen up packaging practices, he urged closer cooperation between industry and military to lower over-all costs and assure complete reliability of weapons systems upon arrival at destinations.

Clarence K. Wiesman, Armour and Co., board chairman of the RESEARCH AND DEVELOPMENT ASSOCIATES (serving the QM Food and Container Institute) recently received the Army certificate of appreciation for patriotic civilian service. . . . MICHIGAN STATE UNIVERSITY PACKAGING SOCIETY members drew some 600 visitors to its recent packaging exposition, including students, parents, faculty members, and some 75 people from industry. Students acted as hosts, showed these visitors what the school is accomplishing in rough handling, physical testing, chemical testing, and production equipment as used in the School of Packaging.

Trends to watch:

Quality evaluation and efforts to eliminate defects are producing steady improvement of corrugated boxes, according to CONTAINER LABORATORIES. Those attending a clinic for its clients heard that bursting tests of boxes bearing a 200-lb. test manufacturer's certificate showed an actual average of 233 lb./sq. in. over the past three years. Likewise, flat crush test results showed improvement along with box rigidity. . . . Combining an outer plastic tube with an inner glass tube, a new package for LUKENS LABORATORIES, is now providing easy-to-use packaging of sterile sutures—with snap-off caps to facilitate use by hospital operating room personnel.

Use of an experimental method of canning frozen fruit concentrate (with aluminum cans being assembled and packed in a continuous operation) on a single production line is "proving successful from every viewpoint," according to MINUTE MAID CORP. . . . REYNOLDS METALS CO. predicts that Florida's entire output of orange, grapefruit, and blend concentrates will be canned in aluminum in two years.

Glass container shipments during 1959 were 7.1 per cent above those of 1958, according to figures recently released by GLASS CONTAINER MANUFACTURERS INSTITUTE, INC. This represents an all-time high according to GCMI. . . . SOUTHWEST RESEARCH INSTITUTE has come up with experimental models of three different methods of producing capsules—especially for hazardous and toxic materials. These include a continuous encapsulating process (gravity feed technique), a method of doing it with centrifugal force rather than gravity, and a multi-orifice apparatus which eliminates use of encapsulation nozzles.

First quarter sales of fold-up metal tubes ran 7 per cent above those of 1959's first quarter, thus setting a new record, according to COLLAPSIBLE TUBE MANUFACTURERS COUNCIL. . . . ALUMINUM FOIL CONTAINER MANUFACTURERS ASSOCIATION says sales of such containers ran 15 per cent higher in the first quarter of this year than that of a year ago, with frozen food and baking industries being the largest users of such containers.

Researchers for CLUPAK report being "not far removed" from developing an extensible paper with all-direction stretch instead of just one-direction extensibility as at present. So far they have turned out paper with elongation of 12 per cent or more, about equal in all directions. . . . UNITED STATES STEEL CORP. says its research center now has a lighter and thinner tin plate permitting production of tin plate about half the thickness of anything now used in can making. The material comes in weights ranging from 40 to 60 lb./base box (217.78 sq. ft.) in contrast to currently used tin plate of 75 to 100-lb. base box weight.

More expansion for packaging:

J-E PLASTICS MFG. CORP. has started full production of pressure formed transparent and colored opaque packaging for fresh and frozen foods. . . . Construction is under way to double the manufacturing and laboratory facilities of the Murray Hill, N.J. plant (for the manufacturing and filling of liquid and dry pharmaceutical and allied chemical products) of STRONG COBB ARNER INC.

CELANESE CORP. OF AMERICA plans to broaden its plastics packaging product line with the purchase of PLASTIC HORIZONS, INC., independent producer of polyethylene film, with plants in Paterson, N.J. and Batavia, Ill. . . . CARNEY AND McREYNOLDS, Chicago, is a new packaging machinery and handling representative firm formed by the partnership of C. J. Carney, Jr. and John W. McReynolds.

The plastics department of REYNOLDS METALS CO. has been given full divisional status "because of the increasing importance of plastic film wrapping products." . . . FIBREBOARD PAPER PRODUCTS CORP. opened its fifth shipping container plant in Phoenix. The 48,000-sq. ft. plant is engineered for high-speed and automatic production. A sixth plant will soon be opened in Hawaii. . . . Plans for expanding production facilities of the ARABOL MFG. CO., maker of adhesives, have been disclosed. They include the opening of a new 10,000-sq. ft. plant in Ohio, a 20,000-sq. ft. facility in Georgia, and construction of another unit at an undisclosed location.

UNION CARBIDE CHEMICALS CO. is now operating its new Technical Service Laboratory in Westchester, N.Y. It is designed to aid in the development and improvement of the products of Carbide's customers, such as those using aerosols, etc. . . . CROWN ZELLERBACH CORP. will consolidate its Kansas City and St. Louis flexible packaging operations in a new 245,000-sq. ft. plant to be constructed near St. Louis.

Plans to open new plants in Chicago and Cincinnati for the manufacture of semi-rigid plastic bottles for packaging liquid detergents and other household products have been announced by OWENS-ILLINOIS GLASS CO. . . . UNION BAG-CAMP PAPER CORP. is exploring the possibilities of acquiring THE CROSSETT CO., the major portion of the purchase price being represented by the vast timberland holdings of Crossett.

Dollars and cents:

MINNESOTA MINING & MANUFACTURING CO. has announced a record first quarter with sales for the first

Rhinelander Glassine and Greaseproof *papers*

Here are versatile papers that economically provide basic protection essential to good packaging . . . foods in wide variety, pharmaceuticals, and industrial products . . . from cereals to tea . . . bandages to piston rings.

For example, the nickel still buys a lot of candy bar . . . but the low retail price demands packaging calculated to the fraction of a cent. Rhinelander Glassines and Greaseproofs, widely used, provide efficient low-cost protection, attractiveness and merchandising appeal, with good printability and trouble-free operation in high-speed automatic packaging.

Inherent barrier properties of Glassine and Greaseproof papers make them ideal for diverse packaging chores.

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3. Vapor and odor resistance
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5. Wide range of basis weights
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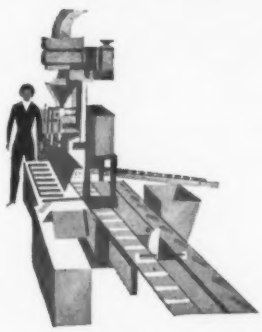
7. Transparency, opacity, variety of colors
8. High density
9. An excellent coating base and printing surface
10. High ratio of mullen to basis weight
11. Compatibility with other packaging materials
12. Approved wet-strength properties

The built-in characteristics differentiating Glassine and Greaseproof from other papers may be enhanced by conversion. Coating, waxing, laminated combinations . . . and the addition of extra properties . . . heatseal, water-vapor resistance, gloss and release properties.

Glassine and Greaseproof are truly remarkable papers . . . available in standard grades or tailor-made to exacting requirements.



AMONG THE MANY APPLICATIONS FOR GLASSINE AND GREASEPROOF . . .

Carton liners and dividers
Bags and bag liners
Package overwraps
Board lining
Unit packaging
Carton inner wraps
Canister and fiber tube laminations
Candy and cookie cups
Retail food service wrap
Package accessories and labels
Corrugation

Write for samples and full information stating application or requirement.

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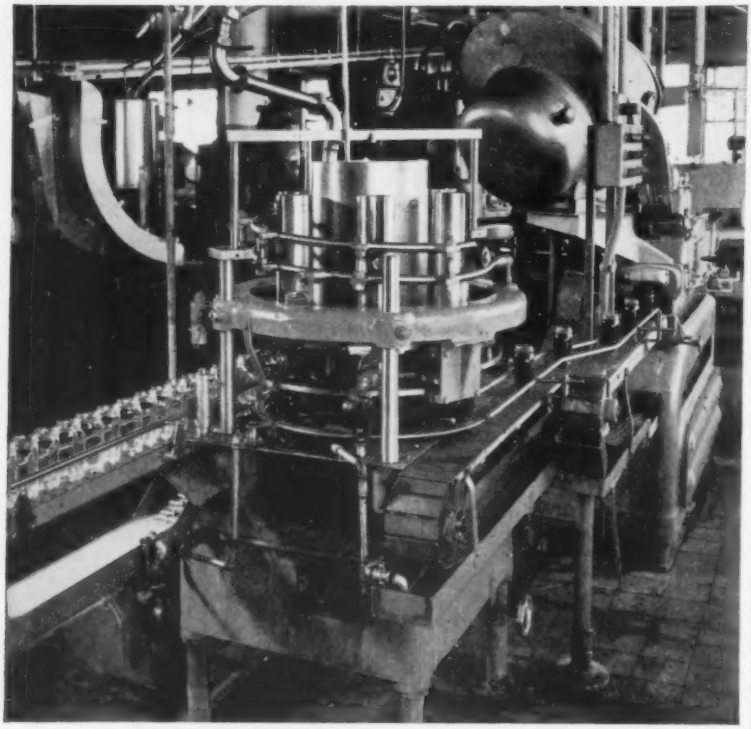

How to fill even viscous hot fudge with speed and accuracy

If you have problems filling heavy or viscous products accurately without losing speed, consider the experience of the Robert A. Johnston Company with their six-station Pfaudler® rotary piston filler.

Mr. A. O. Meyer, Plant Manager, says, "The Pfaudler filler has been giving us some very good results. We fill approximately 55 six- or eight-ounce jars per minute with heavy hot fudge without a spill. And we also package caramel, butterscotch and chocolate syrup.

"The filler takes only about a half hour to clean thoroughly. We've had very little maintenance with it. In fact, all it really needs is a routine cleaning and lubrication."

The RP-6 filler is the smallest in the Pfaudler line . . . an ideal model for filling small lots of a number of products. Change-over for various container heights takes only about 12 minutes. Other models of the rotary piston filler will handle up to 1050 cans a minute. All these fillers are rated to ±0.1 fluid ounce accuracy for most products.

If you'd like the full story on the complete line, write to our Pfaudler Division, Dept. PE-70, Rochester 3, New York.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

PFAUDLER PERMUTIT INC.

Specialists in FLUIDICS...the science of fluid processes

three months of 1960 amounting to $128,669,218. Earnings for this first quarter were $16,217,911. . . . THATCHER GLASS MANUFACTURING CO., INC. reports net sales for the 1960 quarter increased approximately 22 per cent over the same period in 1959 and mounted to $11,726,497. Net income of $470,307 indicated an increase of approximately 9 per cent over the same period of last year.

The annual report of STANDARD PACKAGING CORP. shows that an all-time high was reached in 1959 with net sales of $87,905,640 and a net income of $4,135,989, an increase of 67 per cent over 1958.

In its quarterly report, PHILLIPS PETROLEUM CO. reports a net income of $25,803,588. . . . STONE CONTAINER CORP. states that first-quarter net sales showed a 19-per cent gain, and net income registered an increase of 10 per cent over last year's March quarter. Net sales were $11,195,327 and net income was $504,636. . . . PITNEY-BOWES, INC.'S first-quarter earnings were up 12 per cent over the same period of 1959. It reported gross income of $15,523,841. (up 14 per cent over last year's first quarter) and net earnings were $1,192,194.

CROWN CORK & SEAL CO., INC. reported earnings during the first quarter of $609,000 on sales of $28,765,000. . . . Net sales for FEDERAL PAPER BOARD CO., INC. reached $19,926,000 for the first quarter of 1960 and net income was $908,000. . . . NATIONAL CAN CORP. has reported first-quarter sales of $17,704,239, an increase of 13.5 per cent over sales in 1959 for this period.

SPENCER CHEMICAL CO. reports that in the nine months ended March 31, sales were $35,938,049 and net income was $2,181,694. Expenditures for research and technical activities were about $350,000 larger than a year before. . . . A report from REYNOLDS METALS CO. tells that sales for the first quarter reached $106,615,000 and profits were $6,050,000. . . . CELANESE CORP. OF AMERICA announced net income of $4,847,728 for the first three months ended March 31, 1960. Net sales for this period amounted to $66,712,023, highest for any first quarter in the corporation's history. They were 13.3 per cent above those of the same period for 1959.

A 27-per cent increase in earnings for the first quarter of 1960 have been reported by DIAMOND NATIONAL CORP. With an increase of 7 per cent, net sales for the quarter totalled $54,144,000. . . . PACKAGING CORPORATION OF AMERICA tells that third-quarter net sales for the nine-month period ended March 31, 1960 amounted to $103,997,013 as compared to sales of $94,121,290 for the same period of

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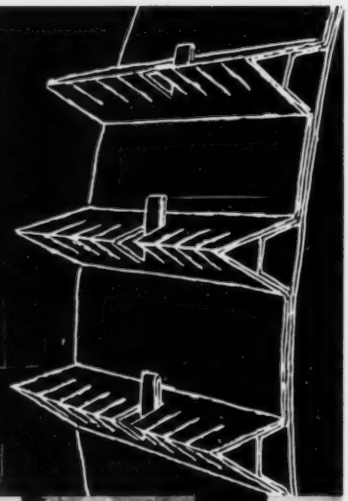
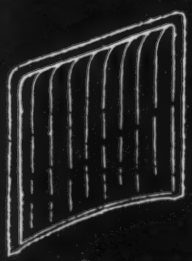
SUS-RAP

LABORATORY DEVELOPED PACKAGES OFFER SUBSTANTIAL SAVINGS IN MATERIAL, LABOR AND TOTAL SHIPPING COSTS*



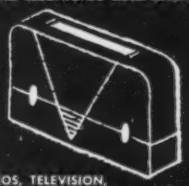
MIRRORS, FRAMED PICTURES, AND OTHER FURNITURE ARTICLES

CLOCKS, INSTRUMENTS, AND ELECTRONIC COMPONENTS

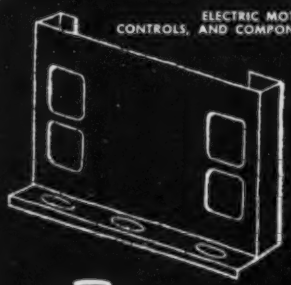


GLASSWARE, SHELVES, FIXTURES, SPECIALTY ITEMS

ELECTRIC MOTORS, CONTROLS, AND COMPONENTS



RADIOS, TELEVISION, AND APPLIANCES

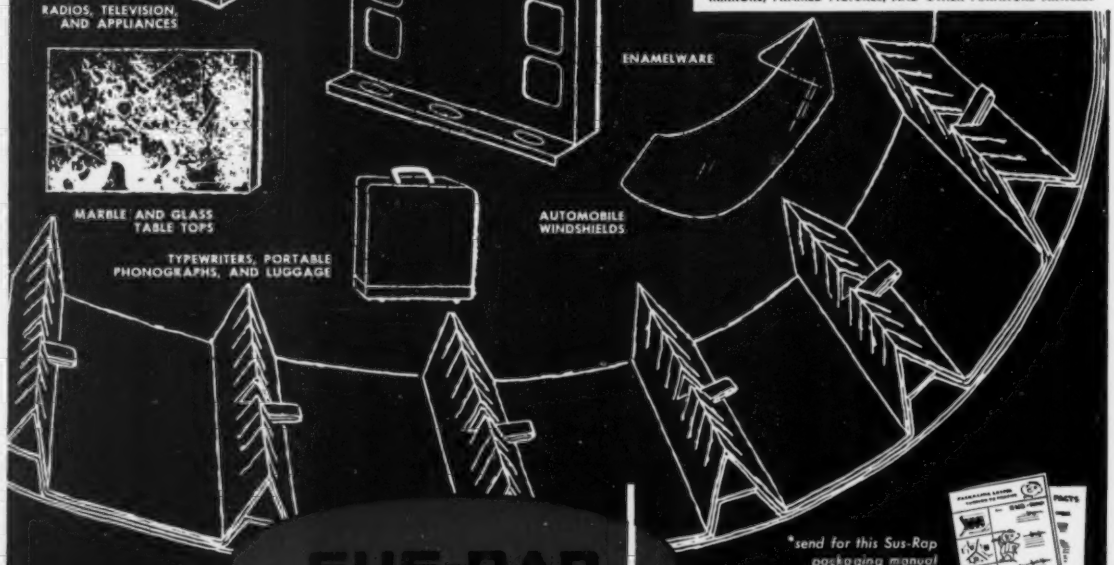


ENAMELWARE

MARBLE AND GLASS TABLE TOPS

TYPEWRITERS, PORTABLE PHONOGRAPHS, AND LUGGAGE

AUTOMOBILE WINDSHIELDS

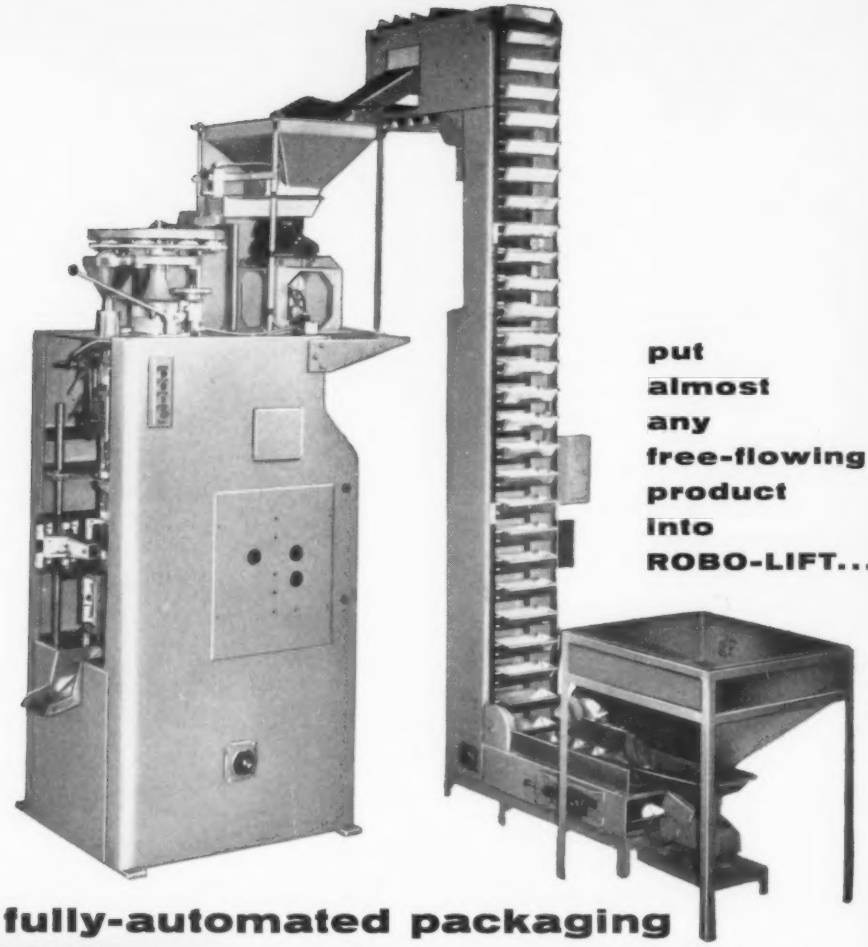


SUS-RAP

*send for this Sus-Rap packaging manual and Packaging Facts . . . today!

VANANT COMPANY, INC.
955 S. Water St., Milwaukee 4, Wisconsin

Laboratory Developed and Tested Packaging



put almost any free-flowing product into ROBO-LIFT...

...get fully-automated packaging out of ROBO-WRAP

Integrated to keep just the right head of product for uninterrupted production. See them working right now in leading packaging operations: forming, filling and sealing up to 120 poly, PVA, cello, paper, plastic or laminate pillow packs per minute. Unique hand-over-hand action holds jaws in sealing position longer, with a combination of strong, jerk-free mechanical and hydraulic pull.

Team Robo-Wrap with the equally versatile Robo-Lift—the automatic bucket elevating conveyor which moves virtually any free-flowing material horizontally or vertically gently and without re-handling—to reduce packaging costs all along the line.

Write now for arrangements to see a Robo-Wrap, Robo-Lift installation in action near you.

LYNCH CORPORATION
Anderson, Indiana

LEADERS LOOK TO LYNCH—
FOR MACHINES THAT PACKAGE ALMOST ANYTHING!

Manufacturing Engineers of automatic processing equipment in the glass, packaging, plastic and other industries.

ATLANTA • CHICAGO • SAN FRANCISCO
ENGLEWOOD, NEW JERSEY

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Circle No. 209 on Card ▶

Still TOPS in M.V.T. PROTECTION

THILCO VAPOTITE

- Keeps moisture-vapor in or out—where wanted . . .
- Is odorless, non-staining, clean, pure and non-toxic . . .
- Preserves food flavors and freshness, longer . . .
- Protects products from tacking, sticking and blocking . . .

TAPE INC. — Packages its gummed roll tape in heavy-duty VAPOTITE bags to protect it from deterioration over extended periods of storage in distributors' warehouses and customer inventory. VAPOTITE'S superior-moisture vapor resistance preserves glue's proper consistency — safeguards against tacking and sticking at temperature extremes. One Tape Inc. customer reports perfect condition Tape even after 6 years of "hidden storage" inventory.

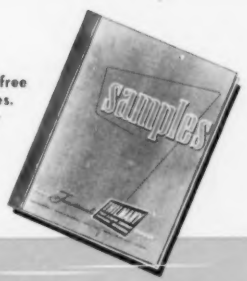
KRAFT FOODS — Gelatin dessert is packaged in a VAPOTITE bag carton liner as the surest way to preserve the product's flavor and freshness and prevent granules from caking. VAPOTITE does not stain or offset, nor does any odor develop from it to permeate the package and damage the naturalness of Kraft's tasty flavors. Because it is sanitary, clean, and non-toxic, VAPOTITE is ideal for packaging food products of many different types.

WILLIAMS CANDY CO. —Of Oklahoma City uses economical VAPOTITE case liners to preserve "factory freshness" of its bulk candies in storage. Hard candies and confections can be produced in "off seasons" and stored for later distribution without danger of sticking and blocking, or loss of sheen due to moisture-vapor penetration. The Williams Co. tested many packaging mediums but found none as effective in M.V.T. protection as VAPOTITE.

WHAT IS THILCO VAPOTITE?

VAPOTITE, as the name implies, is a wax laminated sheet with an exceptionally high M.V.T. rating. It combines two outer plies of closely formed quality kraft, glassine or grease-proof papers, each double-coated and laminated with special blends of microcrystalline waxes. It has packaging strength and pliability which readily permit its conversion into spiral containers, case liners or small unit size bags without damage to wax film M.V.T. resistance. VAPOTITE is *economical, low in cost,* and can be furnished "tailor-made" to specific requirements in color or with eye-appealing print decorating, as desired.

Write —today for free "Tell-all" kit and samples. Tell us the nature of your M.V.T. problem and let us help you with specific recommendations.



THILCO

One Thilco Call — Does it all, for . . . . . *Functional Papers* FOR PROTECTION THAT COUNTS!

NEW YORK • CHICAGO • DETROIT • BOSTON • KANSAS CITY • CLEVELAND • CINCINNATI • CHARLOTTE

THILMANY PULP & PAPER COMPANY
KAUKAUNA, WISCONSIN

It can't be just "adequate"...

PACKAGE MARKING

either makes money or wastes it

Readable, attractive marking made by Markem machines on your boxes or labels helps them from the moment they're marked to the time they're used — and can even help future sales as well. Good marking speeds handling . . . reduces waste and packing errors . . . allows quick selection by customers . . . simplifies and encourages reordering . . . carries the "quality" message of modern package design.

In contrast — *hard-to-read, uneven, "home-made" marking is a hindrance to your package or product from beginning to end* — and can actually waste thousands of dollars a year.

And a Markem marking method makes important "in-plant" savings as well. The right Markem machine, type and specialty ink working in your plant marks the *right* quantities at the right time — with savings in inventory, labor and delivery time . . . eliminates waste from obsolescence . . . handles "short runs" rapidly and economically . . . provides flexibility that allows *one machine to do a variety of marking jobs.*

Call your local Markem man or write directly, enclosing samples and requirements. Markem Machine Co., Keene 35, N. H.

MARKEM

everything industry needs . . . for profitable marking . . . since 1911

a year ago. Net earnings were $4,917,275 as compared to $5,049,150 for the same period of a year ago.

What people are doing:

EDWIN S. WORDEN has been appointed an executive vice president of Edgar Steiner and Co., Inc., New York City firm of research engineers. . . . MRS. EDNA HART, buyer in the purchasing and package development div. of Ciba Pharmaceutical Products, Inc., recently completed Alexander Hamilton Institute's modern business course. . . . Arthur D. Little, Inc. announces the assignment of PETER B. BAKER to its New York City office. JOHN H. WRIGHT will also join its New York staff where both will work with research & development, engineering, and in management services staffs carrying out technical and commercial development projects for packaging material and machinery suppliers and package users. . . . JOHN T. SCHULTZ has joined Packaging Services of California as its director of quality control. . . . The container div. of Jones & Laughlin Steel Corp. tells of the appointment of CARLTON W. OBERG as its Cleveland district sales manager.

DONALD H. BREWER, now a vice president of Rexall Drug & Chemical Co., has been elected to the board of directors of Stone Container Corp. . . . Columbia Box Board Mills, Inc. announces the election of ROBERT R. HOWARTH as president and ARTHUR J. DIMICK to the post of executive vice president and also a member of the board of directors. . . . J. K. LIMBERT has been appointed vice president, egg packaging sales, of Packaging Corporation of America. . . . ROBERT D. FLETCHER has been named district sales manager for the industrial div. of The Kordite Co.

At Container Corporation of America, THOMAS F. CASS will now be responsible for all folding carton operations and for its Sefton Fibre Can Div. HARRY E. MILES will now be in charge of all corrugated operations and FREDERICK S. CRYSLER has been assigned responsibility for all of its paperboard mills and for the Pioneer Paper Stock Co., a subsidiary. . . . The Arabol Mfg. Co. has elected HENRY E. WEINGARTNER, formerly executive vice president, to president.

Hinde & Dauch Div., West Virginia Pulp and Paper, has appointed EDWARD G. PECK as production manager of the Richmond, Va. box plant and GILBERT C. ROBINSON as regional engineer. . . . RAYMOND O. JONES has been appointed Crown Zellerbach Corp.'s director of long-range planning. . . . FRANK W. CONSIDINE has become president of Great Lakes Glass Co. *(End)*

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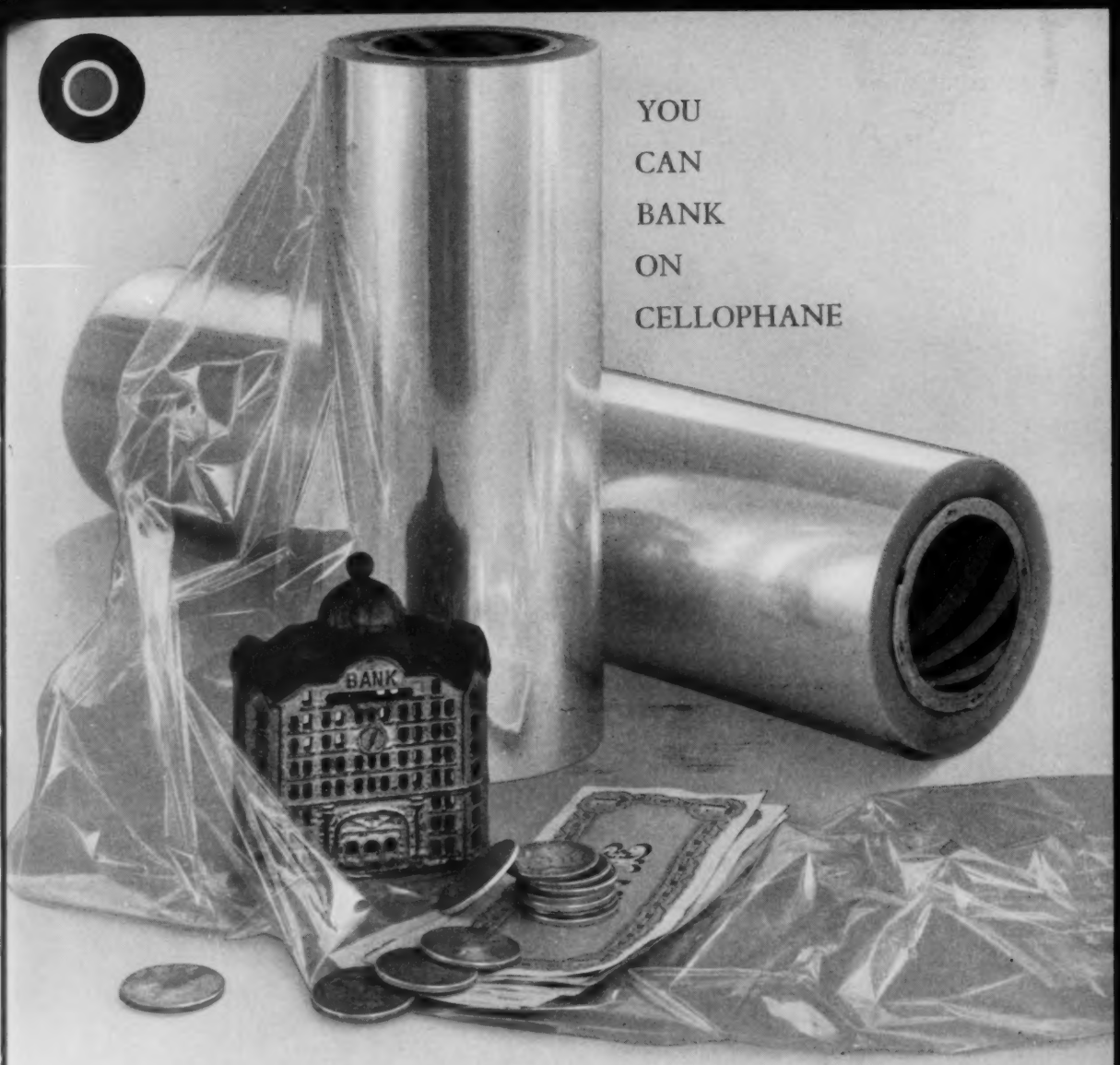
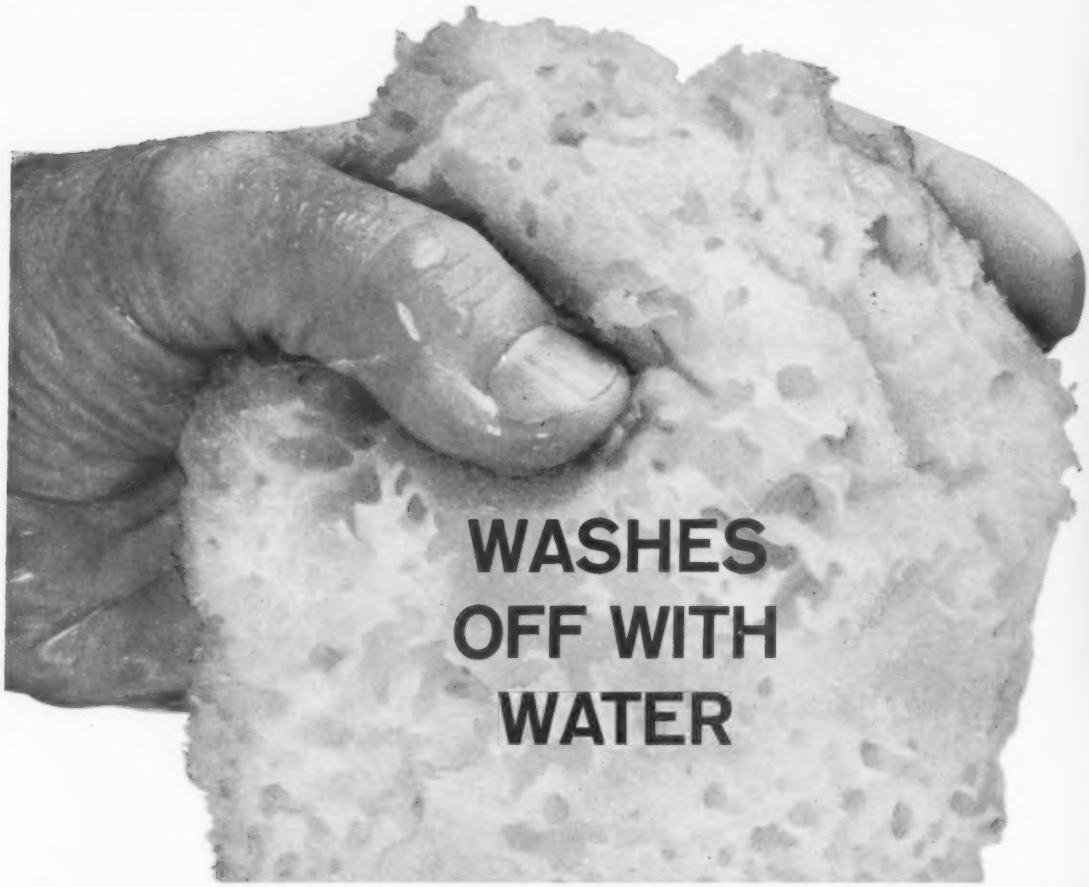


No other flexible packaging material can surpass cellophane's consistent trouble-free performance on today's high speed packaging machinery. Cellophane can be sealed at a wide range of temperatures (from 350° to 500°) and gives strong, positive heat seals anywhere in this range. Its uniformity of gauge runs from plus to minus 5%—to guarantee further the consistency of seals. Cellophane gives you fewer problems, greater packaging efficiency and lower packaging production costs. And here's a point: one standard roll of Olin Cellophane 9½" OD will give you almost one mile of risk-free packaging material. Call in an Olin representative or converter today. P.S. When you see the man from Olin, ask about your copy of Packaging Production News. Olin CELLOPHANE®

OLIN MATHIESON
Packaging Division
655 Madison Avenue, New York 21, N. Y.

Easi-Clean RESIN ADHESIVE



RUNS A WEEK WITHOUT CLEAN-UP

EASI-CLEAN is faster setting, stronger gripping! Runs without trouble. Cleans-up without trouble. An easy-to-use resin adhesive for everything from case and carton sealing to carton forming, double package making and labeling.

EASI-CLEAN doesn't build-up on rollers. Forms no skins in the glue pot. Permits maximum machine speeds. Increases adhesive mileage. Eliminates pop-ups and sifters. Avoids scrap and product losses.

EASI-CLEAN can be used throughout your plant. We'd be glad to arrange a trial run. Write or call your nearest National office.

National
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NATIONAL STARCH and CHEMICAL CORPORATION

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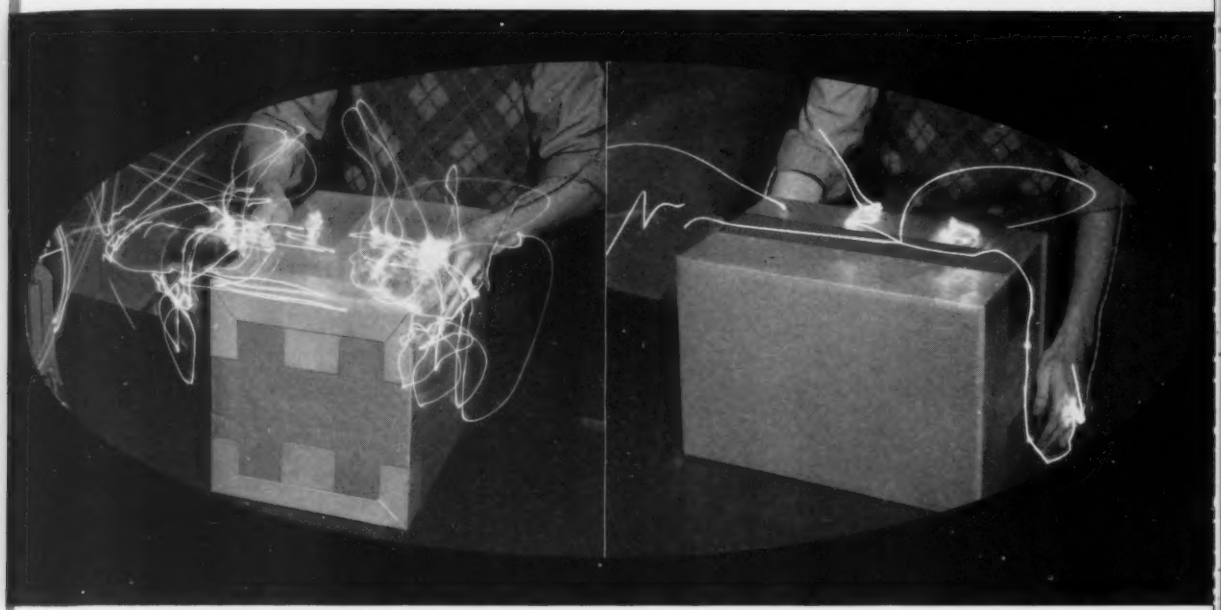
The Ludlow Method
2-STRIP CASE SEALING
FASTER – STRONGER – COSTS LESS



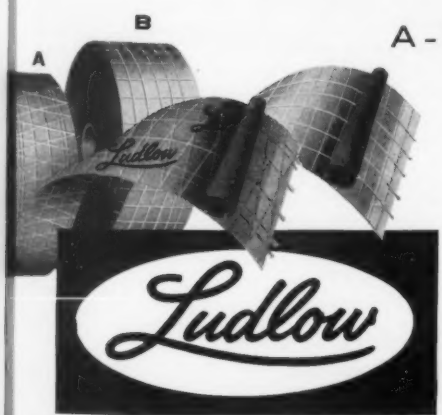
OLD WAY (38.5 Seconds) White lines show actual motions required for sealing *just the top* of a container with plain paper tape.

LUDLOW METHOD (11 Seconds) The same job is done in a single motion. And tough multi-directional fibre reinforcements make closures nearly 3 times as strong.

The tapes that broke the six-strip habit!

Ludlow's reinforced tapes, SNAKETAPE and GLASPUN, are so strong that only two strips are required to seal your cartons instead of the six strips required when plain paper tapes are used. This faster, stronger center seam closure method actually reduces your tape application costs by 66%. Both SNAKETAPE and GLASPUN are approved for shipment on all carriers, including railroads under U.F.C. Rule 41.

Be sure to specify *Ludlow* reinforced tapes — either glass-reinforced GLASPUN, or world-famous SNAKETAPE, the *only* reinforced tape with rayon reinforcement. The Ludlow name is your best assurance of uniform quality and dependability.



A - **SNAKETAPE®**
Rayon-Reinforced

B - **GLASPUN®**
Glass-Reinforced

LUDLOW PAPERS • Needham Heights, Mass. • Dept. 172

Please send me more information on the Ludlow 2-Strip Sealing Method. I am now using ☐ Staples ☐ Wire Stitching ☐ Plain Paper Tape

*Name*_____ *Position*_____

*Company*_____

*Street*_____

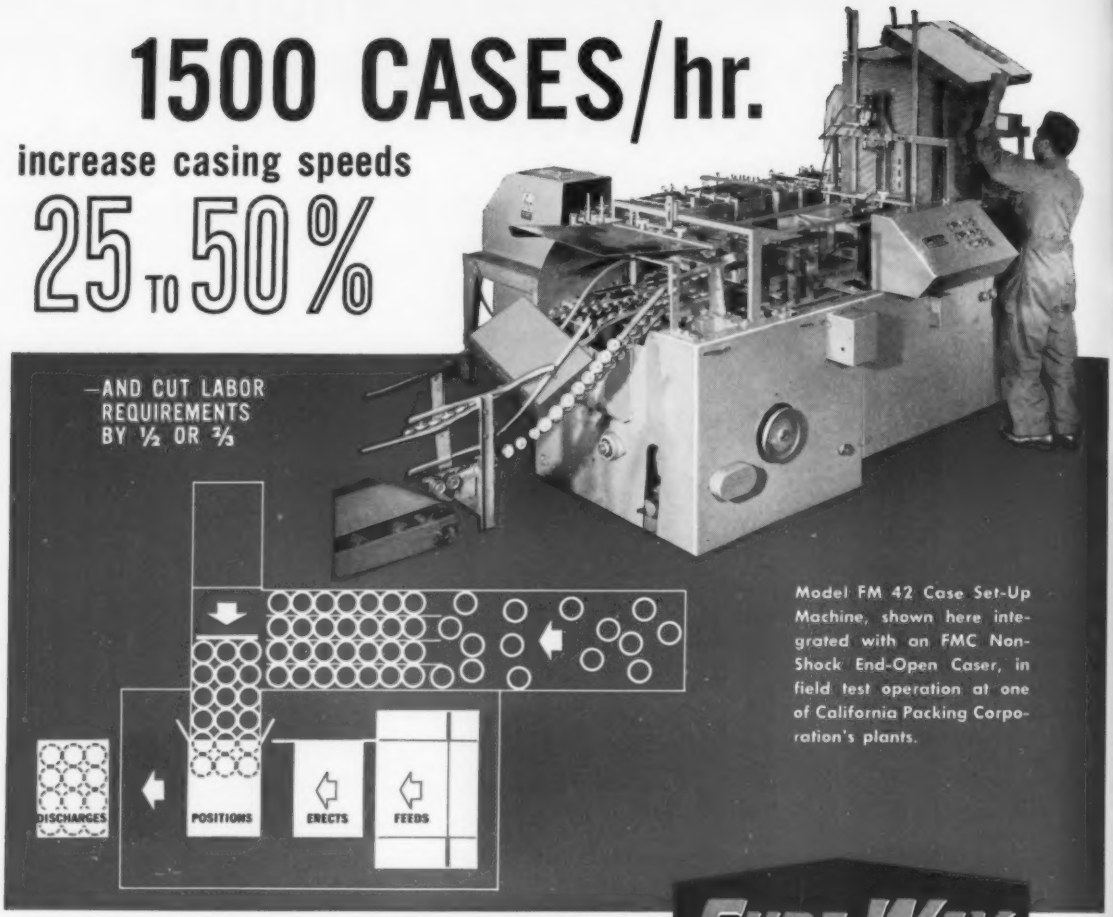
*City*_____ *Zone*____ *State*_____

VPI-Coated Papers • Greaseproof Papers • Waterproof Papers • Poly-Coated Papers • Gummed Tapes • Federal Spec. Papers • Label & Specialty Papers • Plastics

1500 CASES/hr.

increase casing speeds

25 TO 50%



Model FM 42 Case Set-Up Machine, shown here integrated with an FMC Non-Shock End-Open Caser, in field test operation at one of California Packing Corporation's plants.

—with the NEW SURE-WAY®

CASE SET-UP MACHINE

If you have either an FMC Non-Shock Caser for cans, or a "Sure-Way" Package Caser, consider the additional speed, efficiency and savings in operator manhours now available to you with the new, *fully-automatic "Sure-Way" Case Set-Up Machine.*

Under present conditions, if you are operating your caser in the area of 1200 cases an hour, you are probably using two or three operators to set up and feed cases to the machine. *Add a "Sure-Way" Case Set-Up Machine and experience these benefits:*

- *Up production to 1500 cases an hour*
- *Reduce manpower by 1 or 2 men*

The only manual function involved is that of placing flat shipping cases in the feed magazine of the Set-Up Machine—it's as simple as that. In fact, one man can easily attend two automatic lines at the same time.

An extremely versatile unit, this machine can be made to handle top, side or end-open cases as large as 25″ x 24″ x 18″, or as small as 7″ x 7″ x 3″—and given ranges between these extreme limits. Moreover, it is easily adapted and integrated to existing caser installations, and in many instances may be furnished with a "Sure-Way" Case Sealer for a fully integrated operation.

Get full information on this precision engineered equipment today—for more profitable casing operations tomorrow.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Division

General Sales Offices:

WESTERN: SAN JOSE, CALIF. • EASTERN: HOOPESTON, ILL.

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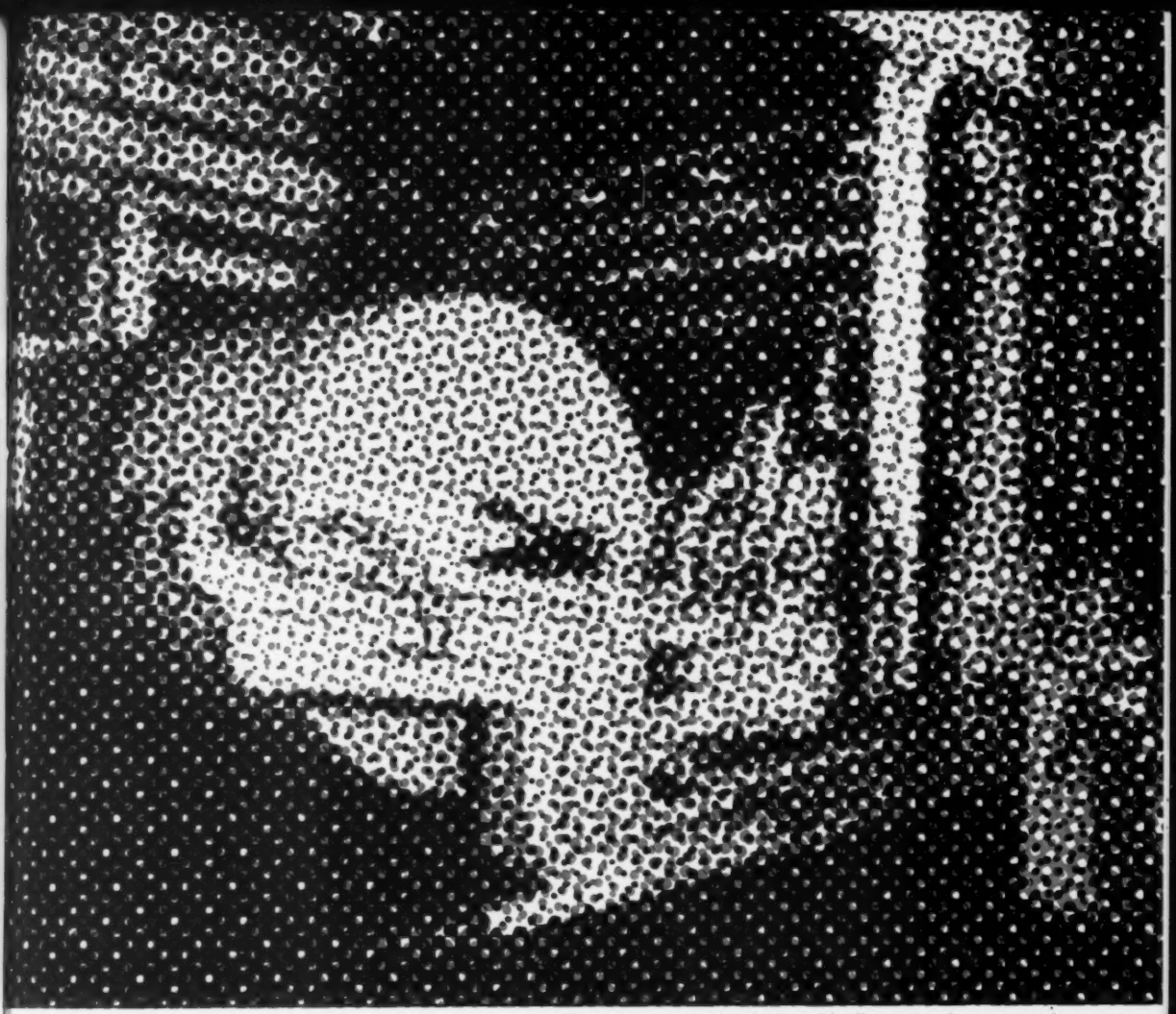


For a new perspective, look at this illustration from across the room.

Crossett Machine Time Plan – new perspective on purchasing paper

"For fourteen hours every month," one Crossett customer likes to say, "I own this paper mill." This is virtually what happens with each of Crossett Paper Mills' regular customers. Each has specific amounts of *machine time* reserved each month for his specific requirements.

The Crossett Machine Time Plan means that Crossett customers can count on getting paper precisely as and when ordered—and always at a fair price.

Crossett Leatherneck Wrapping Paper. Consistent quality in all weights, weight-controlled for customer savings.

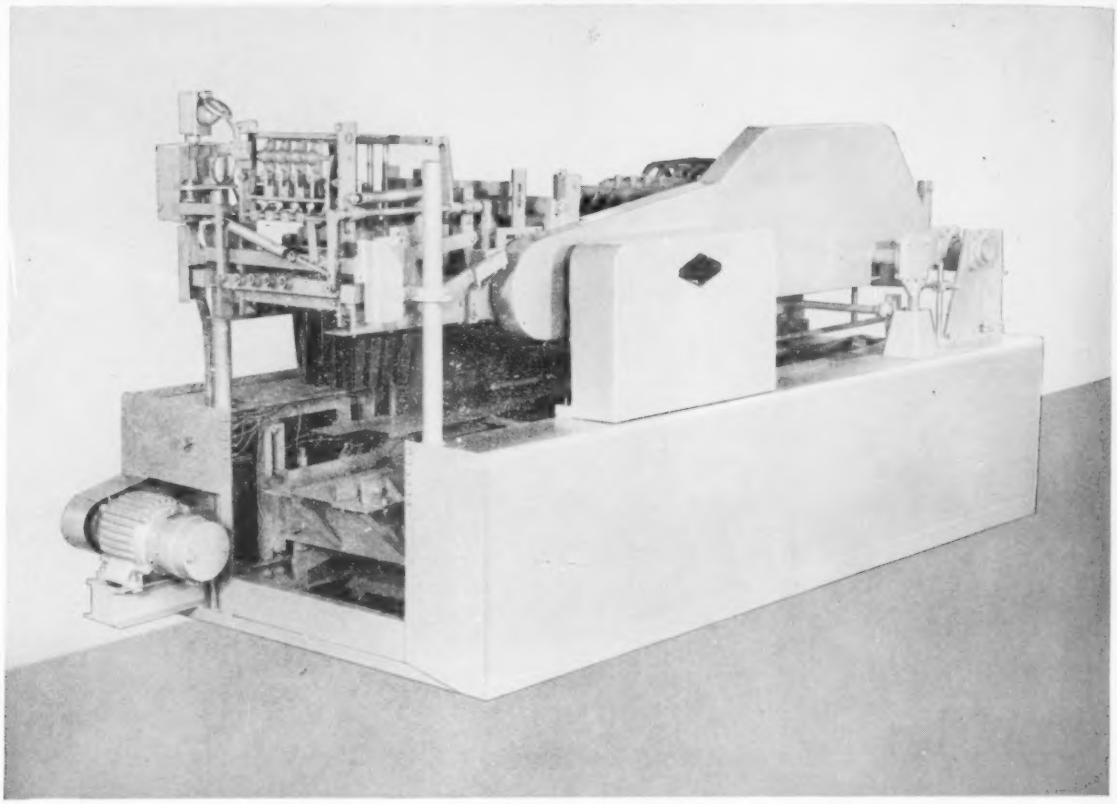
Crossett Leatherneck Converting Kraft. Custom-produced to the exact weight and quality needed. Basis weight control assures predictable yardage per ton. Crossett Technical Service available to customers.

Crossett Food Board. Cylinder machine production places long and short fibers precisely where needed for every packaging and printing requirement. Crossett Technical Service helps with customer problems.

Crossett
PAPER MILLS

A Division of The Crossett Company, Crossett, Arkansas, makers of paper, lumber, charcoal and chemicals. All from managed forests.

NEW!... from ATKRON DUMORE



Continuous Motion Case Packer

Interchangeable heads pack all bottles or cans in single or multiple layer cases!

- FAST—Packs up to 30 cases per minute
- NO COMPRESSED air required
- POSITIVE PACKING CONTROL — Any irregularity in supply of bottles, cans or cases automatically delays packing drop until corrected by machine itself or operator
- SIMPLE OPERATION—Requires only casual attention of one man
- COMPACT — Small space requirements compared to machine capacity . . . 4' 9½" by 10' 4" in conveyor layout
- ELIMINATES bottle or label scuffing
- EASY CHANGEOVER for different bottles or cans (sizes and packs) can be accomplished in only 20 minutes
- ADAPTABLE TO PLANT LAYOUT—Fits all standard conveyors at standard conveyor heights
- LOW INITIAL COST and minimum maintenance

to cut your new can handling costs . . .

ATKRON DUMORE AUTOMATIC CAN SORTERS AND UNCASERS

. . . Automatically uncase, align and orient new cans ready for filling
. . . Adaptable for cans received in reshipper cartons, shipper trays, bags or bulk
. . . Speeds up to 1200 cans per minute with casual attention of only one man
. . . Models to handle all standard cans—6 oz. to 5 quart; cone top, screw cap and pressurized cans; rectangular, square and most specialty can styles.

Check other ATKRON DUMORE Equipment: Full depth and half depth Uncasers and Four Flap Case Openers. Write for complete information . . . it can easily make the difference between profit and loss in your plant.

ATKRON DUMORE

MANUFACTURED BY ATKRON, INC., CUYAHOGA FALLS, OHIO

Distributed and Serviced exclusively by

GEO. J. MEYER MANUFACTURING CO. MILWAUKEE, WIS.

and

ECONOMIC MACHINERY CO. WORCESTER 3, MASS.
Division of Geo. J. Meyer Manufacturing Co.

AT-1059-143

A NEW, ULTRA-SONIC, NON-CONTACT SENSING AND SWITCHING SYSTEM

SONAC*

Here truly is a new dimension in automated controls! Delavan's new SONAC uses ultrasonic energy for its "beam". This new concept offers many advantages over available sensing devices. SONAC has no lamps to burn out . . . nothing to replace . . . eliminates down time. SONAC is unaffected by vibration, dust, industrial contamination or ambient light. SONAC will sense ferrous and non-ferrous metals, liquids or solids, transparent or opaque materials, yet requires less power than an ordinary flashlight. These are a few of SONAC's advantages.

Send for this complete descriptive booklet. There's no cost or obligation.

PATENTS PENDING
*Sonac is a trade mark of the Delavan Manufacturing Co.

DELAVAN
Manufacturing Company
WEST DES MOINES • IOWA

At last! A single polyethy

crystal-

and t

It's Du Pont's exclusive 2-IN-1 polyethylen

Here's a major step forward in polyethylene film for b packaging . . . Du Pont's exclusive new 2-in-1 polyethyle film. It's the only polyethylene film that combines *b* crystal clarity *and* toughness.

- How clear is it? Du Pont's new 2-in-1 polyethylene fi is as clear as the clearest bag film you can buy.
- How tough is it? Du Pont's new 2-in-1 polyethyle film offers a toughness matched only by hazy, high-i pact polyethylene.

thylene film that's both

h-clear

d tough!

ylene film designed specifically for bag packaging

lm for b
lyethyle
bines b

nylene fi

lyethyle
, high-i

is means you no longer have to sacrifice clarity for rability when specifying a polyethylene bag film!

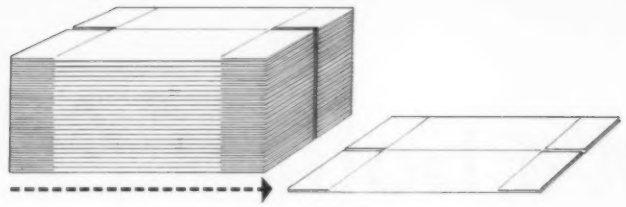
Pont 2-in-1 polyethylene film is now available in nted roll stock and bags through Du Pont Authorized nverters . . . or plain roll stock from your Du Pont Repre- ntative. Call an Authorized Converter or Du Pont Rep- entative for all the facts on this latest advance from Pont . . . leader in packaging film for 35 years. Pont Company, Film Dept., Wilmington 98, Del.

DU PONT
REG. U.S. PAT. OFF.

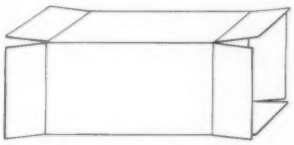
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

DU PONT polyethylene film

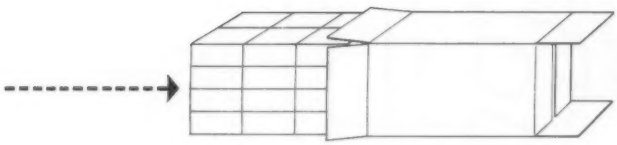
STANDARD-KNAPP
TYPE SK-880 INTEGER



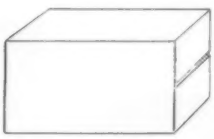
STRIPS OFF FLAT CASE



OPENS IT

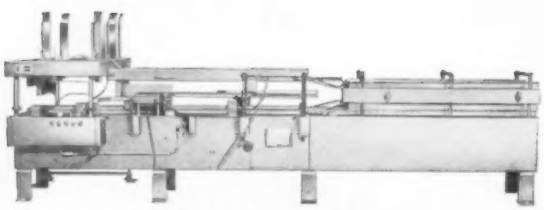


PRESENTS IT FOR LOADING



GLUES AND SEALS IT

IN A SPACE ONLY 18½′ LONG BY 6′ WIDE



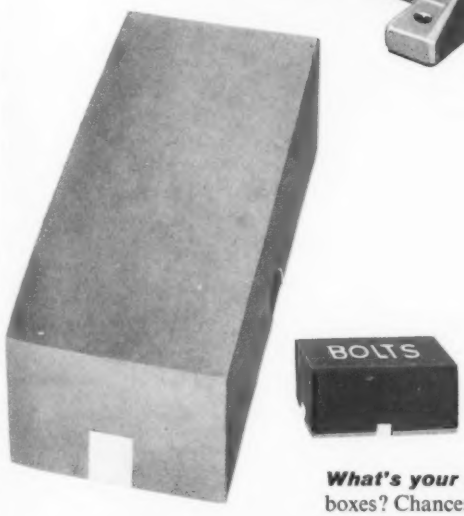
The Integer is a most undiscriminating unit. It can be built to handle cases of all rectangular shapes, even squares. It handles them smoothly whether they have glued, taped or stapled "manufacturer's seams." And equally important, case selection, feeding and opening are deftly mechanical and completely positive. No vacuum problems, no clogging. Case sealing is done by our Glu-Line system — the newest and stingiest method of gluing. You save on glue but get the strongest kind of case seal. For the full story on the SK-880 Integer — the complete case handling system — write Emhart Manufacturing Company, Portland Division, Portland, Connecticut.

EMHART

SEAL

up to 75 units a minute with "SCOTCH" BRAND Tapes

While you're reading this sentence, a "SCOTCH" BRAND S-70 Series Motorized Box Sealer can securely seal eight boxes. That's 3M-Matic Taping in action.



Motor driven taping head applies right-angle clips of "SCOTCH" BRAND Tape for sure-holding closure. Seals tuck-in flap or full-telescope boxes, quickly, attractively. Tapes are clean running, stick tightly, and are supplied in a rainbow of vivid colors.

See how a "SCOTCH" BRAND Motorized Box Sealer can speed up your package-sealing operation. Do a better job of holding without messy residue. Save you time and money too.

In addition, "SCOTCH" BRAND Manual Box Sealers are also available, as well as heavy duty packaging Sealers adjustable up to 10" in length.

What's your sealing problem? Small boxes . . . medium boxes . . . large boxes? Chances are your 3M Representative can solve it for you. Ask your local "SCOTCH" BRAND Tape Distributor for more information or write: 3M Co., 900 Bush Ave., St. Paul 6, Minnesota.

When tape costs so little, why take less than "SCOTCH" BRAND?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVENUE, NEW YORK 16. CANADA: LONDON, ONTARIO.

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Tapes for Packaging

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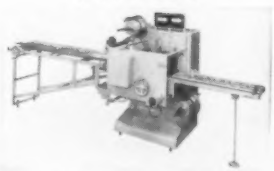
If your daily packaging includes at least 20000 overwraps



...Battle Creek Machines can probably wrap them better, faster,

more economically than any other

Hard-to-package solid articles or loose objects on bottom cards are eye-appealingly pouch wrapped in heat sealable or cohesive papers at 15 to 80 per minute speeds by the quickly adjustable Model 151 Flexopaker. Its chain type intake is admirable for use where automation is desired, and the machine's flexibility permits short runs requiring quick changeover or longer runs requiring high production. Within a range limit of 27" x 15" x 1" and 2" x 2" x 1/16", Baked Goods; Automotive and Electrical Parts; Textile, Medicinal, Paper and Toiletry products are creatively packaged. Write for details today!

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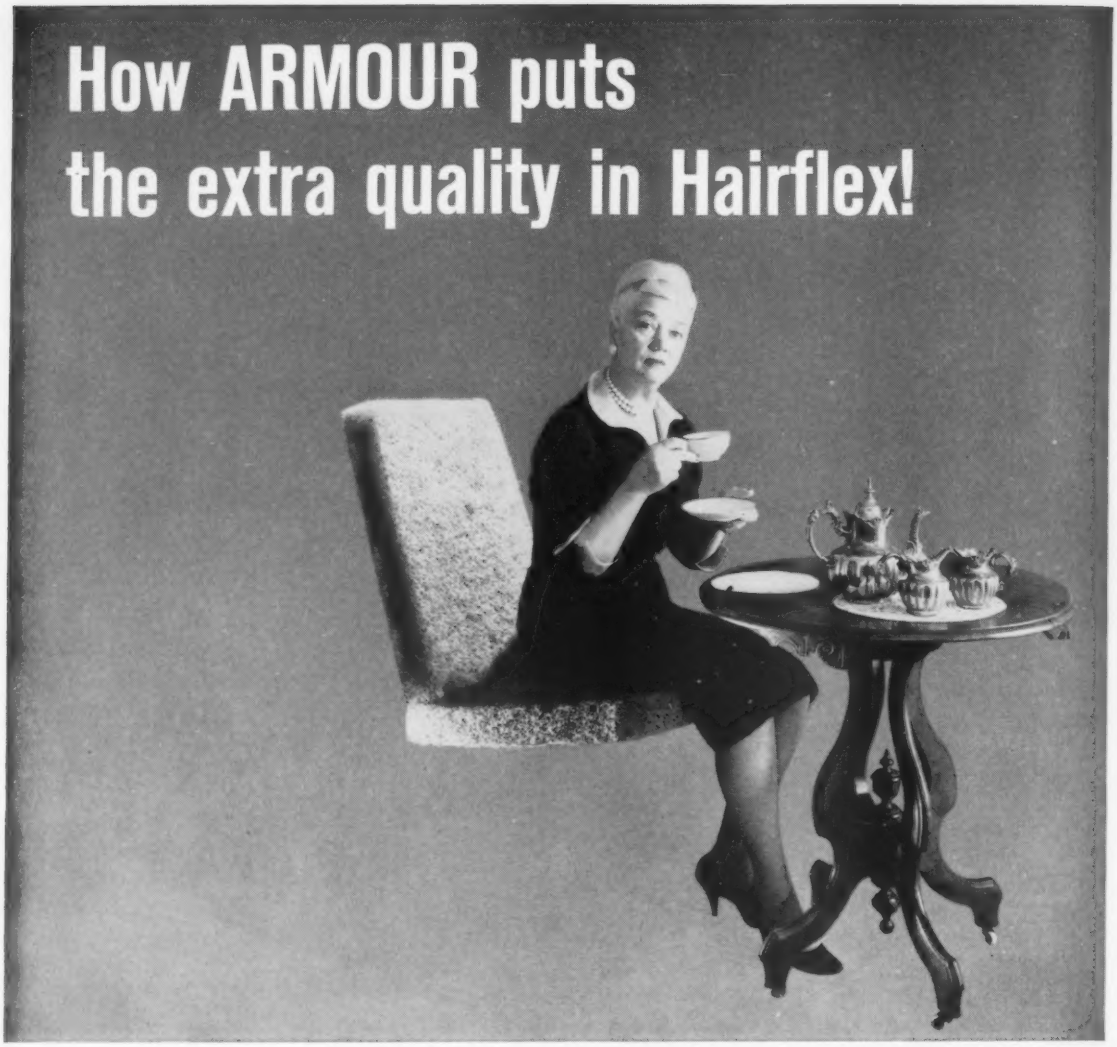
How ARMOUR puts the extra quality in Hairflex!



Armour Supreme Hairflex is available in sheets, rolls and die-cuts for a wide range of furniture and bedding uses. Ask your Armour man to give you details on Armour merchandising streamers and brochures to help sell your product.

Extra care every step of the way makes Armour Supreme Hairflex the highest quality cushioning material available today.

To give your product the luxury and comfort that only Supreme Hairflex can, Armour uses only prime winter domestic northern hog and domestic cattle tail hair. And Armour chemists carefully compound Latex emulsions under laboratory-like conditions to deliver uniformly excellent resiliency and long life.

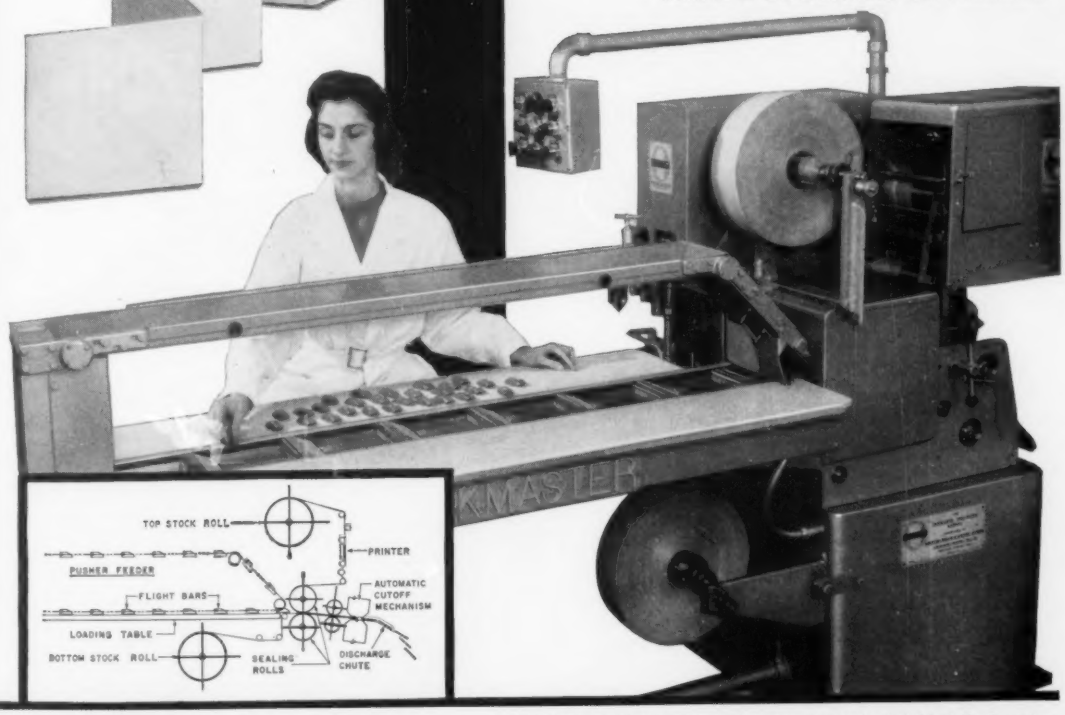
The complete processing operation is done in Armour's own plants using the most modern, automatic equipment to keep quality high, costs low. What's more, Supreme Hairflex is treated with one of the newest germicides, giving you a completely bacteriostatic product.

Finally, Armour maintains the latest, high capacity converting equipment to see that you get Supreme Hairflex according to your most detailed specifications, and production schedules.

If you'd like more information and samples of Armour Supreme Hairflex, call your Armour man, or contact the factory direct. There's no obligation, of course. Cushioning Products Division, 16123 Armour Street, N.E., Alliance, Ohio; 2001 Saybrook Avenue, Los Angeles, California.

ARMOUR ALLIANCE INDUSTRIES

You can cut material costs on packages like these...



New Sundstrand Model 50-A Packmaster has pusher-feeder that permits use of lighter heat-sealable foils, films, or paper

The all new Packmaster doesn't drop your product onto the web of packaging material. The pusher feeder mechanism slides it on as shown in the diagram at the lower left.

Particularly when handling heavy or sharp edged parts, the pusher feeder prevents tearing or piercing the web. The net result is that lighter weight, less expensive materials can be used. The savings mount up big.

Packages ranging from 2″ to 8″ wide and 2″ to 16″ long are produced by the Packmaster at production rates up to 150 per minute. They may be transparent or opaque both sides or transparent one side, opaque the other. The completely airtight packages provide ideal protection for an unlimited variety of both hard and soft goods.

Automatic hopper feeders can be provided to insure accurate counting and faster loading of small parts into individual packages or kits.

Write for new 50-A Bulletin today. For complete recommendations, describe your requirements and submit samples.

MARK OF SUNDSTRAND RELY-ABILITY

SUNDSTRAND-AMERICAN BROACH
ANN ARBOR, MICHIGAN
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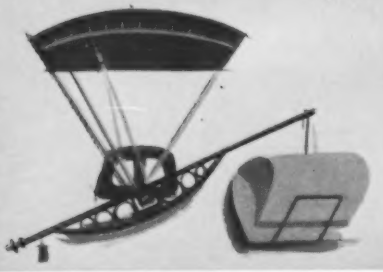
PUSHER FEEDER mechanism slides the product to be packaged onto the web of packaging material. This eliminates tearing or piercing of the web, often permits use of lighter, less expensive materials.

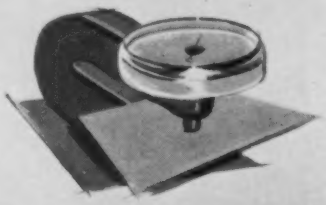
COMPLETE CHANGE OVER of the standard Model 50-A Packmaster can be accomplished in 15 minutes or less simply by changing the easily accessible heat sealing dies and, if required, repositioning the pusher feeder bars and changing the roll stock.

For more information circle No. 224 on Reader Service Card

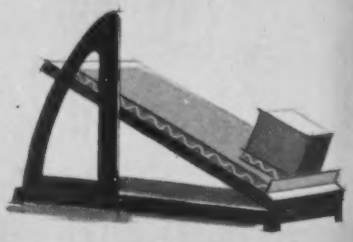
QUALITY CONTROL FOR CORRUGATED



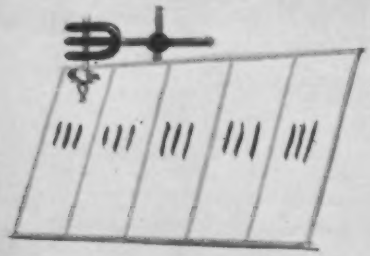
BASIS WEIGHT TEST measures accurate weight of linerboard.



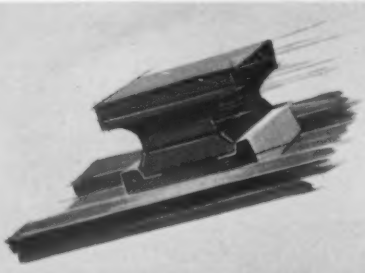
MICROMETER TEST measures proper caliper of linerboard.



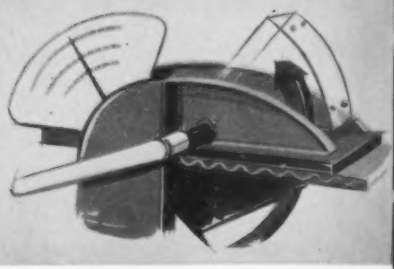
SLIDE TEST determines skid-resistance of linerboard.



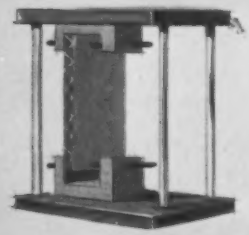
OIL DROP TEST measures printability of linerboard.



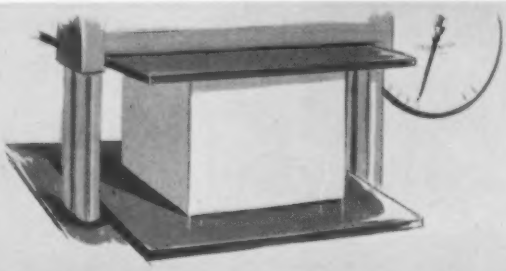
SCUFF TEST determines resistance of surface to scuffing.



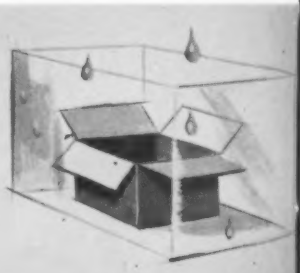
PUNCTURE TEST measures resistance of corrugated board to puncture.



NAIL PULL TEST measures the toughness of corrugated board.



COMPRESSION TEST measures stacking strength of finished box.



HUMIDITY TEST measures strength of box under high humidity.

Do you tend to think that a box is "just a box?" Actually, a St. Regis corrugated box must meet higher standards of quality and performance than you probably ever imagined. Here you see eighteen individual "torture tests" that make up our system of quality checks. It's what many a St. Regis box goes through before it's ok for you.

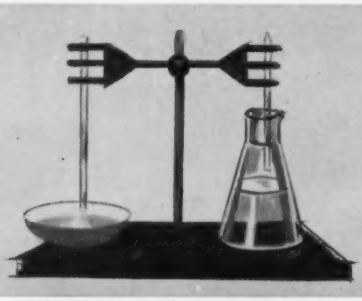
With this system, possible flaws are carefully hunted down, in linerboard as well as finished carton. And the box that actually protects your product in transit measures up to these quality controls, well beyond standard "book" rules.

We separately test both liners and corrugated medium in the various ways shown above; then the final box with its contents takes a "train ride" in the laboratory. Certain tests have been developed to simulate the rough-and-tough shipping conditions that a container may have to survive. This unusual 18-step quality check is typical of the care and attention you get as part of St. Regis service.

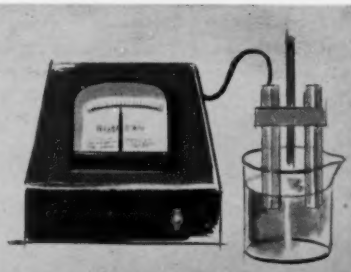
We exercise similar controls in *designing* the box best suited for your product: its shipping, storing, stacking, handling and selling. Rely on our skilled packaging engineers for remarkable ingenuity in creating containers for you. When you need corrugated boxes of any kind, call on St. Regis. Use *our* imagination.

BOXES..18 ST. REGIS® "TORTURE TESTS"

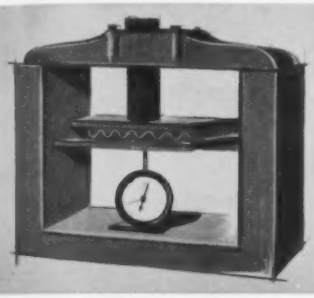
TEAR TEST shows how much resistance liner has to tearing.



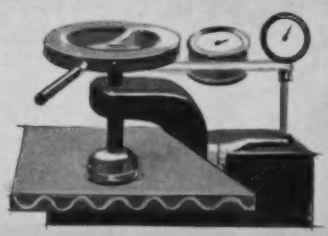
CHLORIDE/SULPHATE TEST measures liner's content of these chemicals.



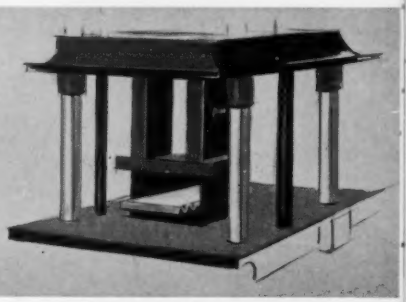
pH TEST shows relative acidity/alkalinity of material.



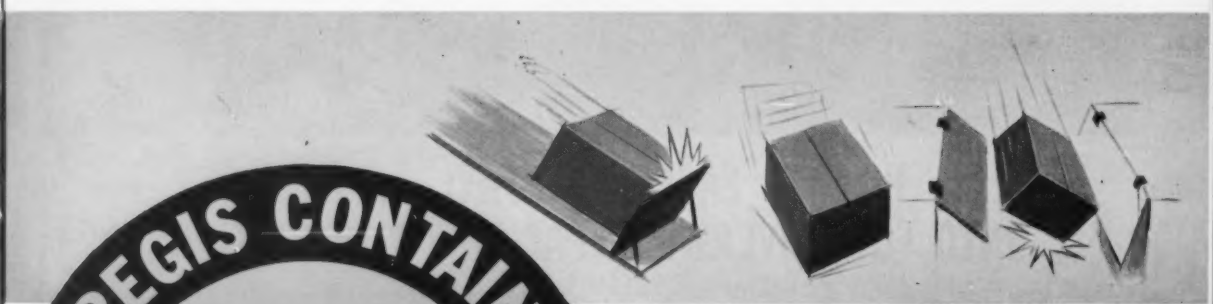
CONCORA MEDIUM TEST establishes crush potential of corrugated board.



MULLEN TEST evaluates burst-resistance of corrugated board.



T.M.I. CRUSH TEST measures pressure needed to flatten corrugations.



HUMPING, SHAKER and DROP TESTS show how much box can "take" in transit . . . prove its stamina under extreme handling conditions.

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St. Regis corrugated box plants are strategically located throughout the country, wherever industry is concentrated. Their design and production facilities are at your service.

From a nationwide family of fine St. Regis corrugated plants, you'll gain in many ways: Well-seasoned, imaginative designers serve you on both local and national levels • Consistent quality is assured from St. Regis tree to St. Regis box • New packaging materials continually emerge from a fully staffed research department • And you'll enjoy working with the friendly, experienced people who *are* the St. Regis Container Division!

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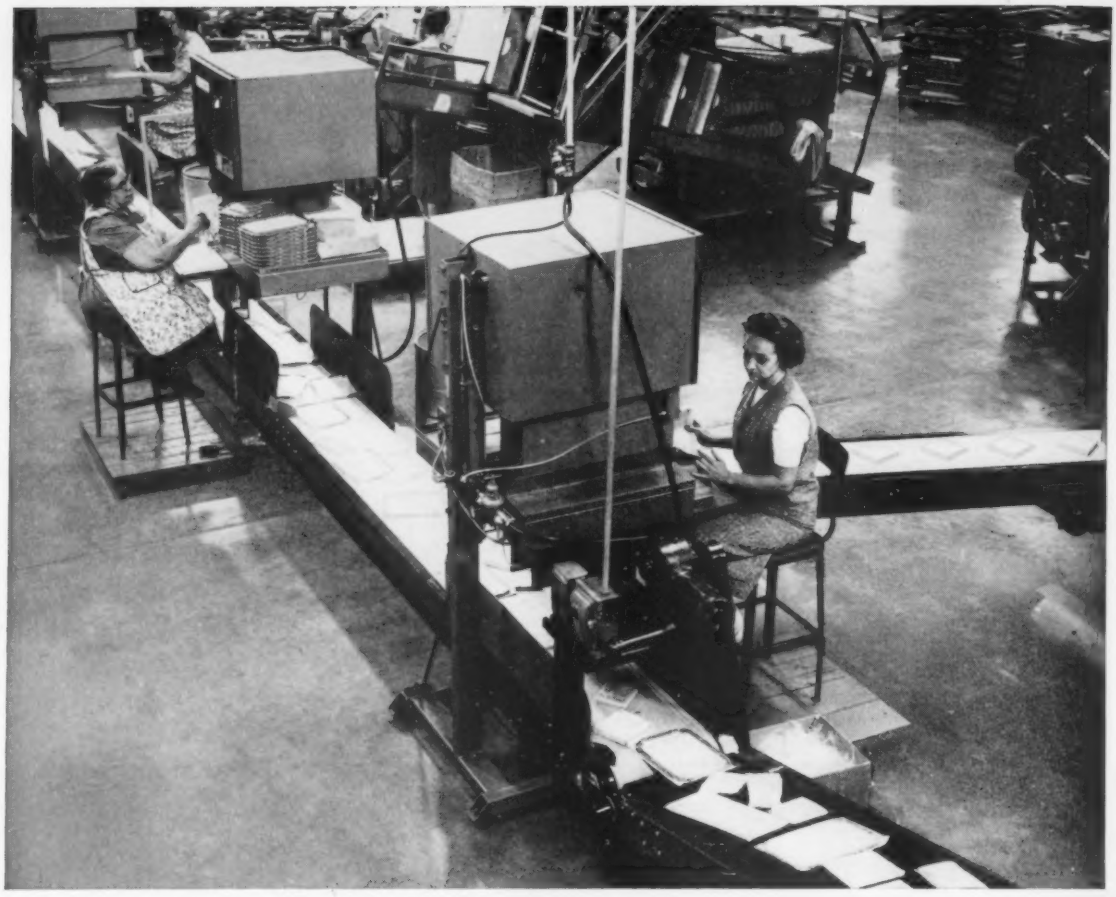


HOW TO EASE POLYETHYLENE FILM INTO YOUR OVERWRAP PACKAGING OPERATIONS

You can lower your costs and end up with better overwraps by switching your packaging operations to economical polyethylene film. The period of change-over to polyethylene will be smooth, too, if you keep these three simple rules in mind:

OBTAIN THE PROPER EQUIPMENT

Various types of polyethylene-handling equipment and accessories are available from packaging machinery manufacturers and film suppliers. The different heat-sealing and temperature control systems, in particular, should be thoroughly investigated, since these are generally the most critical features of equipment or adapters. And take advantage of the help you can receive from U.S.I. packaging and instrument and control engineers in selecting the equipment you need. Because our experts work closely with machinery makers, they are able to answer your questions and help you solve problems.

MAINTAIN SPECIFIED FILM GAUGE

For proper sealing, the thickness of the film must be uniform because this affects heat transfer. The way to guarantee uniform thickness is to set up realistic film gauge variation specifications for your packaging operation. Then make sure your supplier meets these specs.

In general the best type of film to use in overwrap applications is *cast* polyethylene film. It has a more positive gauge control during manufacture, and it has exceptional clarity—an important advantage in most overwrap packaging. U.S.I. supplies PETROTHENE® polyethylene resins which are ideal for making *cast* film.

TRAIN OPERATING PERSONNEL

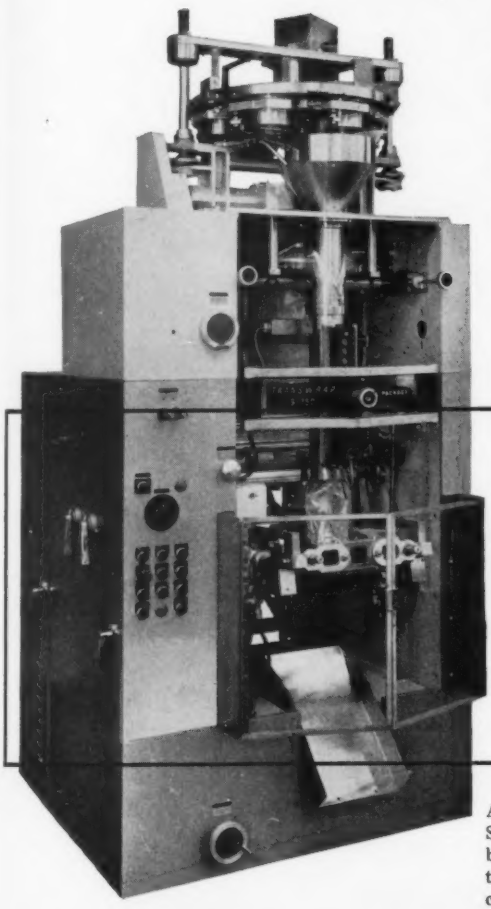
Any initial change-over problems can be greatly eased by proper training and supervision of operators. Many machinery manufacturers and film suppliers will show operators how to get best performance from both machinery and film. U.S.I., too, will be glad to advise on any technical or training problems that may arise.

Wherever these three points have been followed, polyethylene film has delivered its full promise—a more economical, more saleable package for baked goods, paper, candy, and many other products. If you'd like the advice or aid of U.S.I. in making the most of polyethylene in overwrap machinery, write to:

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.
Branches in principal cities

10 BIG REASONS

why the Transwrap S-750 gives you more for your Packaging dollar!



- **Up to 75 bags a minute.** Convenient handwheel regulates speed from 25 to 75 bags per minute.
- **Modern push-button controls.** Centralized controls provide utmost convenience, simplified operation.
- **Wide size range.** Forms bags 3" to 15" long, 2" to 8½" wide. Bag change-over time reduced to less than 15 minutes.
- **No oiling of drive unit.** Sealed ball and roller bearings in central drive unit require *no lubrication.*
- **⅛" Impulse sealing.** Save on material with the new, improved impulse end seal. Wire cut-off makes clean, consistent ⅛" end seals.
- **Fully-protected electrical controls.** Dust and waterproof panel houses all electrical controls, makes cleaning easier and faster, reduces maintenance.

EXCLUSIVE FEATURES

- **Completely new modern design.** Styled by Peter Muller-Munk Associates, foremost industrial designers.
- **Fastest drawbar action.** New linear, crank-operated drawbar, spring counterbalanced for longer life, speeds bag forming.
- **New paper feed.** Unique pre-feed roll arrangement eliminates drawbar pull and film stretching.
- **New plug-in end seal assembly.** The only machine to offer fast, easy change-over of sealing mechanism for different types of film.

All-new engineering, performance, and appearance make the Transwrap S-750 the most advanced bag forming, filling, and closing machine you can buy. The S-750 runs polyethylene and all other flexible, heat-sealable materials, is especially adaptable to pouch packaging of frozen vegetables and candy products. Get all the facts on how the Transwrap S-750 will help you increase your profits. Call your PACKAGE Sales Representative today.

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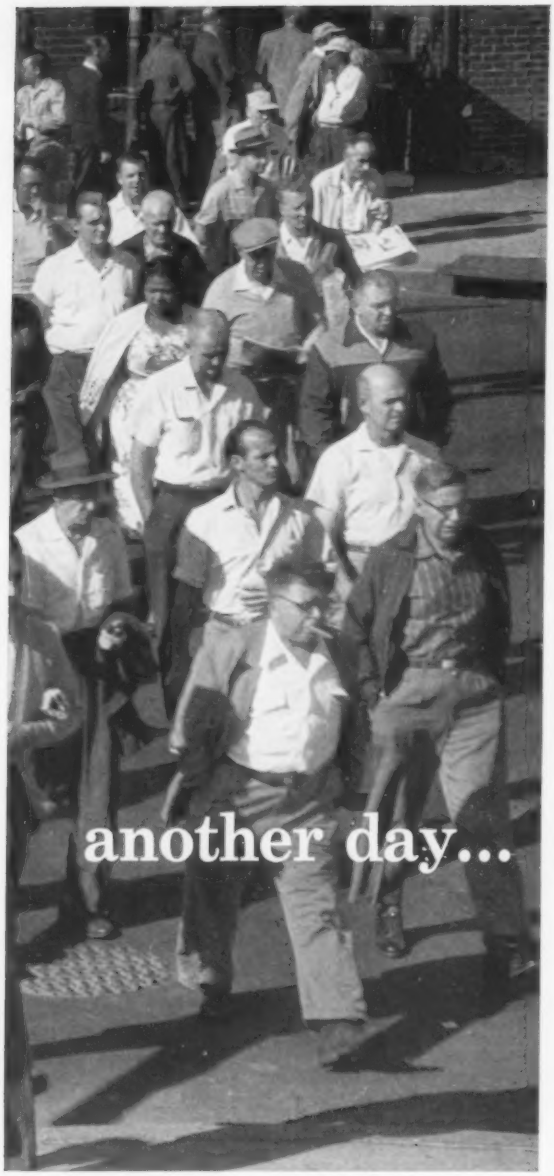

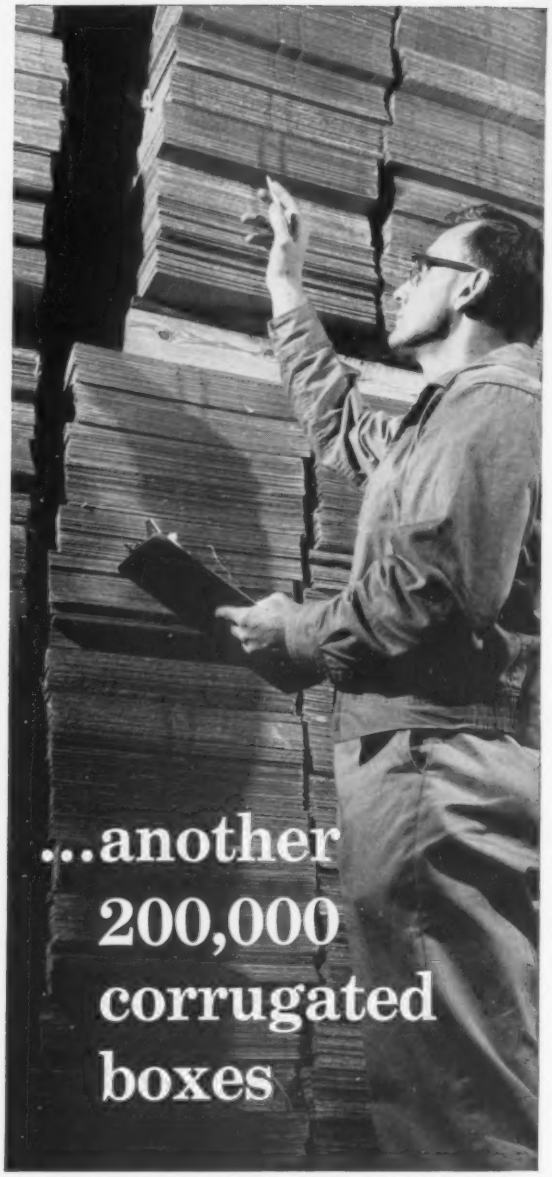

In an eight-hour shift, Hinde & Dauch's Chicago plant (just one of seventeen) manufactures as many as 200,000 standard regular slotted boxes. This *volume capacity* is important to H & D customers. It assures them of a virtually limitless supply, a highly reliable source of the boxes they need for sustained production. After all, isn't this the kind of supplier support you'll be demanding during the competitive months to come?

Hinde & Dauch Division

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Heat penetration into plastic packages for heat-processed foods*

By R. C. Wornick,
Central Research Laboratories, United Fruit Company, Norwood, Massachusetts,

and Marcus Karel and B. E. Proctor,
Department of Food Technology, Massachusetts Institute of Technology, Cambridge

The rate of heat penetration into a container (into which a product is packaged *before* heat processing) influences, to a large extent, the heat processing times required to provide sufficient sterilization for the product. With the use of plastics for packages increasing daily, the authors investigated the rates at which heat is conducted into containers made of flexible plastic films. Describing the details of the experimental work, they show heating curves of the various materials tested, and conclude that the films tested are interchangeable as packaging materials without altering heat-processing time very much, and offer little resistance to heat conductivity into the package.

In recent years a new concept in food packaging began its evolution with the development of flexible plastic films of increased thermal stability. The flexible food container began to be considered as a package in which thermal sterilization might be performed, or as a container in which the consumer might heat packaged food items for consumption.

In 1955, Hu, *et al (3)* screened many of the commercially available films for properties which would be adaptable to the new "boil-in-the-bag" industry. Since then, many new resistant films, such as linear polyolefins, polycarbonates, and others, have been developed *(5, 6, 8, 9)*.

Recently, in the department of food technology at M.I.T., at the Quartermaster Food and Container Institute, and elsewhere, investigations have been initiated on the several factors which are pertinent to the application of these new films to heat processing *(1, 2, 4)*.

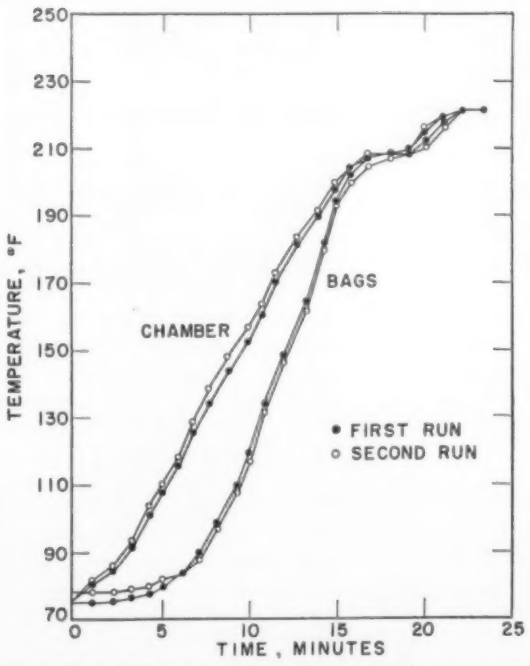
Since the heat processing times which are necessary to obtain adequate sterilization depend to a large extent on the rate of heat penetration into a container, it seemed desirable to obtain information on the rates at which heat is conducted into containers made of flexible plastic films. *(Turn page)*

*Contribution No. 392 from the Department of Food Technology.

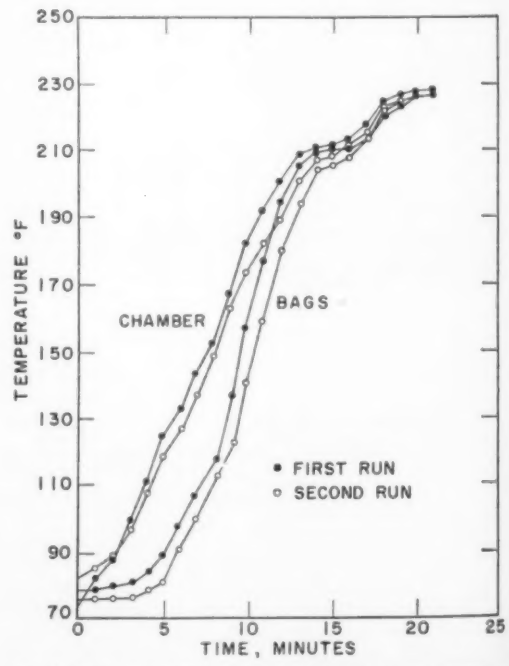
Ronald C. Wornick received his B.S. degree in chemistry and biology from Tufts University in 1954, and his M.S. degree in food technology from M.I.T. in February 1960. From 1955-1957, he served in the U.S. Army in the 1st Army area food laboratory. A food technologist at the United Fruit Company, Mr. Wornick is a member of the Institute of Food Technologists.

Marcus Karel is a graduate of Boston University with an A.B. degree. He also attended the Munich Technological Institute and is completing requirements for a Ph.D. in food technology at M.I.T. Since 1951, he has been on the research staff of the food technology department and is now a research associate. Mr. Karel has been engaged in research in food technology and food packaging and is author or co-author of some 15 technical papers in these fields. He is a member of Sigma Xi, Phi Lambda Upsilon, Institute of Food Technologists, TAPPI, American Chemical Society, Packaging Institute, and Plastics Institute.

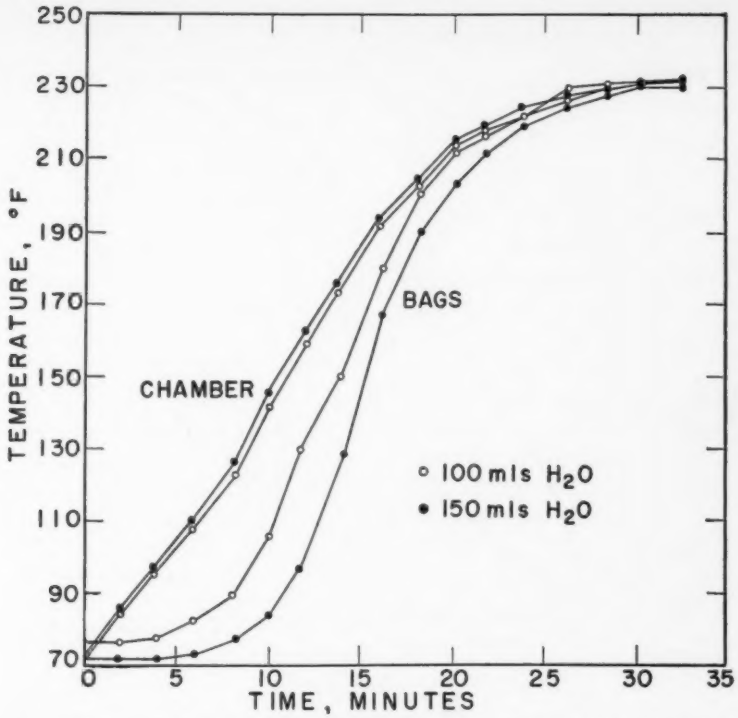
Bernard Emerson Proctor received his B.S. and Ph.D. degrees from M.I.T. in 1923 and 1927, respectively. Rising rapidly through the ranks of assistant professor and associate professor at M.I.T., he was appointed full professor of food technology in 1944. He was head of the department of food technology from 1952 until his sudden death while at work on September 24, 1959. During World War II, he was director of subsistence and packaging research and development, Office of the Quartermaster General, Washington. Dr. Proctor was president of the Institute of Food Technologists, 1952-1953, and a member of the official delegation for the United States to the United Nations International Conference on peaceful uses of atomic energy in Geneva, Switzerland, 1955. He co-authored the textbook, *Food Technology*, and authored some 80 papers in the field of food technology. The passing of Dr. Proctor has left a great void at M.I.T. and among his co-workers and friends.



1 Heating curves for two 3x4-in., 0.001-in. Mylar bags, each one containing 50 ml. of water. Each bag was processed separately.



2 Heating curves for two 3x4-in., 0.00125-in. polypropylene bags with 50 ml. of water. Each bag was processed separately.



3 Heating curves for 3x5-in., 0.00125-in. polypropylene bags containing 100 and 150 ml. of water. Data was obtained by same manner as for Figs. 1 and 2, except that cooker air exhaust valve was closed manually when chamber reached temperature of 210°F., to eliminate any lag.

OBJECTIVES

The thermal conductivities of the various films considered in this study have been reported in the literature *(7)*. However, a determination of the heating times for foods in various film packets of different films of varying size and thickness are not readily obtainable by mathematical extrapolation, due to changes in the geometry of the packet and the film itself during heat processing *(2)*.

Film Effect On Processing Time

In order to determine the effect of various films and film thicknesses on processing time, this investigation was directed toward duplication of heat processing procedures which were used in related studies in this department *(2)*. The films which have been investigated here are 0.001-in. Mylar polyester film, 0.001-, 0.002-, and 0.003-in. high-density polyethylene, and 0.00125-in. polypropylene.

PROCEDURE

Film packets were prepared by heat sealing these materials into bags 3x3 in., 3x4 in., and 3x5 in., plus a 1-in. margin. These bags were then filled with a known amount of test material and mounted onto a rack.

This rack was designed to control physical distortion of the film surfaces during processing to such an extent that the position of the thermocouple, with respect to the film walls, the liquid or solid portions, and the gaseous headspace, during the heating and cooling cycles, could be reliably predicted.

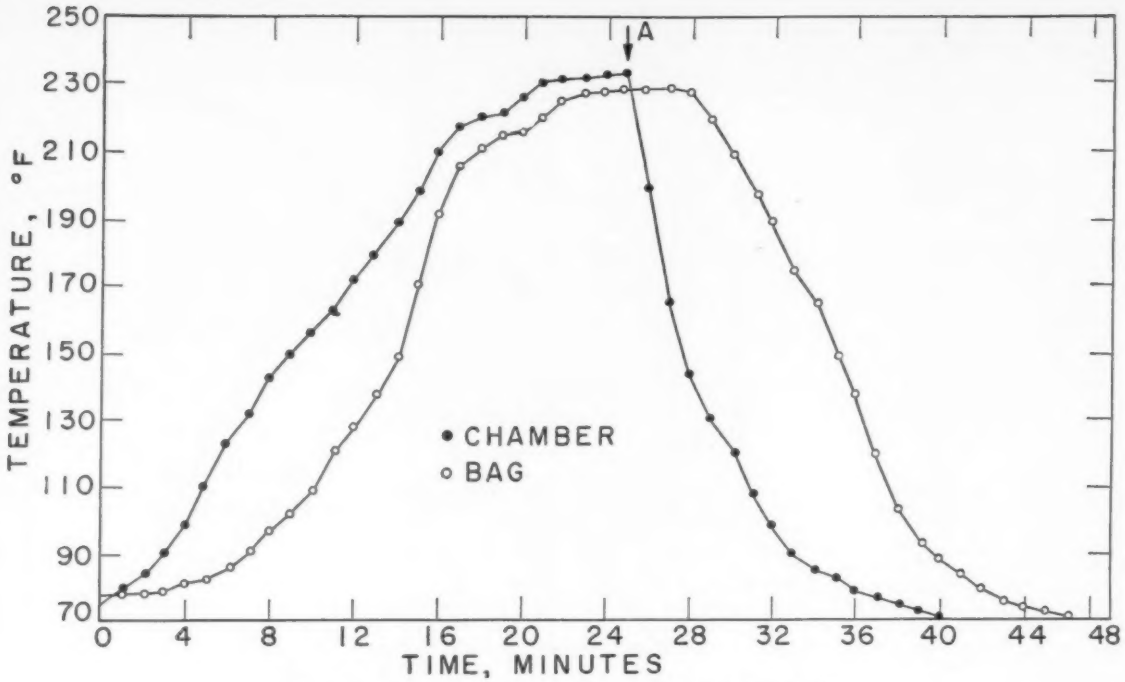
Thermocouple At Center Of Bag

Before mounting the filled bag, the thermocouple probe was fitted through a slit in one heat-sealed edge, and clamped into place with two small circular rubber gaskets and a screw clamp, which maintained the thermocouple at the center of the packet. This technique eliminates any internal parts which might interfere with heat flow, and does not distort the bag geometry.

Two Methods Of Heating

The rack and film packet were arranged as described above, and then placed into either a standard four-quart home style pressure cooker with a pressure control valve, temperature and pressure gauges which are fitted to the cover, a sealed orifice for the potentiometer wire, and an air line for pressure cooling; or into a commercial horizontal steam retort.

The four-quart pressure cooker was placed into a deep pan fitted with water inlet and outlet lines for cooling with cold water. The rack was heated in the commercial retort by placing the rack away from the area in which live steam entered, and by leaving the door slightly ajar in order to maintain a temperature of 212°F. and avoid pressure in the chamber. All tem-



4 Heating and cooling curves for 3x4-in., 0.003-in. high-density polyethylene bags containing 50 ml. of water. Cooling started at Point A.

peratures were taken potentiometrically with calibrated copper-constantan thermocouples.

RESULTS

The heating curves shown in Fig. 1 are for two 3x4-in., 0.001-in. Mylar bags containing 50 ml. of water. Each bag was processed separately. Although perfect duplication of heating conditions was not attained, the relationship between chamber and bag temperature was maintained.

In Fig. 2, heating curves are shown for two 3x4-in., 0.00125-in. polypropylene bags containing 50 ml. of water.

The heating curves shown in Fig. 3 are for 3x5-in., 0.00125-in. polypropylene bags containing 100 ml. of water in one instance and 150 ml. of water in the other. These data were obtained by the same method described for Figs. 1 and 2, except that the cooker air exhaust valve was closed manually when the chamber reached a temperature of 210°F. This was done to eliminate the lag which occurred in previous runs when the chamber released air prior to sealing.

Fig. 4 shows a heating and cooling curve for a 3x4-in., 0.003-in. high-density polyethylene bag containing 50 ml. of water.

Closely Correlates Past Work

The temperature plots obtained during both the heating and cooling correlate closely with previously reported pressure-volume relations in bags of the same size and material during the same operations *(2)*.

These curves (Figs. 1, 2, and 3) point out that, with long come-up times in the pressure cooker chamber, film differences are difficult to detect.

By placing the rack and bag in the horizontal retort, and determining the time required for the center of the bags containing various foods to reach 212°F., a reasonably sound series of values was obtained. These closely approximate differences in the heating characteristics of the various food items employed.

The come-up time for the retort (to 212°F.) varied between 75 and 90 sec. In more than 60 per cent of the runs, the come-up time was exactly 80 sec.

In the table, the heating time for various films, bag sizes, food items, and film thicknesses to reach 212°F. is given.

DISCUSSION

The heating lag shown in Figs. 1 and 2 appears to be no larger than would be expected for water alone. It was suspected, therefore, that the plastic films used in this investigation, regardless of type or thickness (up to 0.003 in.), would have a negligible heat resistance compared with that offered by surface films.

Little Effect On Heating Time

The results shown in the table offer further proof that changing the film or film thickness does not alter the heating time appreciably.

The average time to raise 50 ml. of water to 212°F. in a 0.001-in. high-density polyethylene bag, compared to a 0.003-in. high-density polyethylene bag, differed by 2 sec., a value below the precision of this technique.

A theoretical consideration of this phenomenon serves to substantiate these findings. Almost all of the resistance to heat transfer in a fluid is encountered in the stationary fluid film in contact with the heating surface.

Fluid Heats By Conduction

Since this fluid film heats by *conduction*, it may present considerable heat resistance, depending on the viscosity of the fluid and the temperature of the surface film.

It is possible to apply the thermodynamic techniques used for steady state conditions to the data obtained in Fig. 3 in order to approximate the total thermal resistance offered by the 0.001-in. Mylar film plus the two surface films. It is then possible to roughly compare this value with the calculated value for heat flow through a similar bag in which the only resistance is 0.001-in. Mylar.

Obtain Relative Resistances

Such calculations have been performed and may be used to obtain first order estimates of the relative resistances of the film as compared with the two fluid films. These estimates (based on the data in Fig. 3) were as follows:

During the 5- to 10-min. interval, the resistance of the Mylar and the fluid films was approximately 90 times greater than the resistance of Mylar alone.

In the 10- to 15-min. interval, the ratio diminishes to nearly 40 times, and for the 1-min. interval from 14 to 15 min., it is still 20 times greater than the resistance due to Mylar alone.

In view of these magnitudes it appears safe to conclude that the thermal resistance of the plastic itself, at least in the thicknesses used in this study, represents a negligible portion of the total thermal resistance.

CONCLUSIONS

Based on the experimental data and on theoretical calculations, it may be concluded that 0.001-in. Mylar, 0.00125-in. polypropylene, and 0.001-, 0.002-, and 0.003-in. high-density polyethylene may all be interchanged as packaging materials without appreciably altering the heating time.

It may also be pointed out that, in considering the heating times of foods in flexible plastic bags, the heating time will be more nearly a function of the conductivity of the food and the shape of the container, with the plastic film offering little resistance.

Since the heat resistance of plastic films is of such a low order of magnitude, the heating of foods in plastic bags may be expected to be economically reasonable and fairly rapid within the limits of the physical properties of the food.

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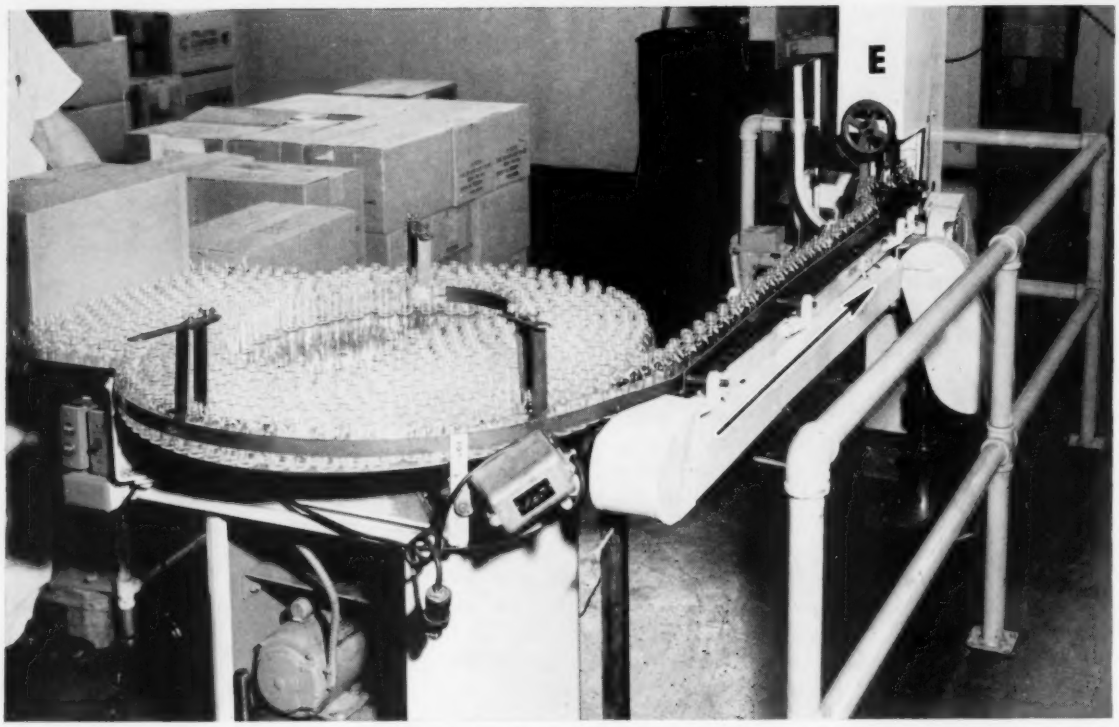
TABLE

An Evaluation Of Heating Times For Various Food Items In Plastic Film Bags Of Several Sizes And Film Thicknesses

Bag Size, Film, And Product	Time To Reach 212°F. At Bag Center (sec.)			Average Time For Retort To Reach 212° F. (sec.)	Average Initial Bag Temperature (°F.)
3x4 in., Mylar (0.001 in.) with:					
50 ml. water	150	160	160	79	59
75 ml. water	180	170	185	80	60
25 gm. blanched corn and 25 ml. water (probe placed in two central kernels)	260	280	275	80	69
40 gm. blanched spinach	370	340	345	80	71
50 gm. tomato puree	230	210	240	78	74
50 gm. cream of mushroom soup concentrate	240	260	255	79	74
3x4 in., polypropylene (0.00125 in.) with:					
50 ml. water	165	150	160	80	60
25 gm. blanched corn and 25 ml. water (probe placed in two central kernels)	270	270	280	80	68
40 gm. blanched spinach	365	380	350	80	70
50 gm. tomato puree	225	250	250	80	72
50 gm. cream of mushroom soup concentrate	260	265	250	79	74
3x3 in., high-density polyethylene (0.001 in.) with:					
50 ml. water	160	165	145	80	60
3x5 in., high-density polyethylene (0.001 in.) with:					
50 ml. water	125	120	135	80	60
3x3 in., high-density polyethylene (0.003 in.) with:					
50 ml. water	165	150	150	80	60
3x5 in., high-density polyethylene (0.003 in.) with:					
50 ml. water	145	140	130	79	60

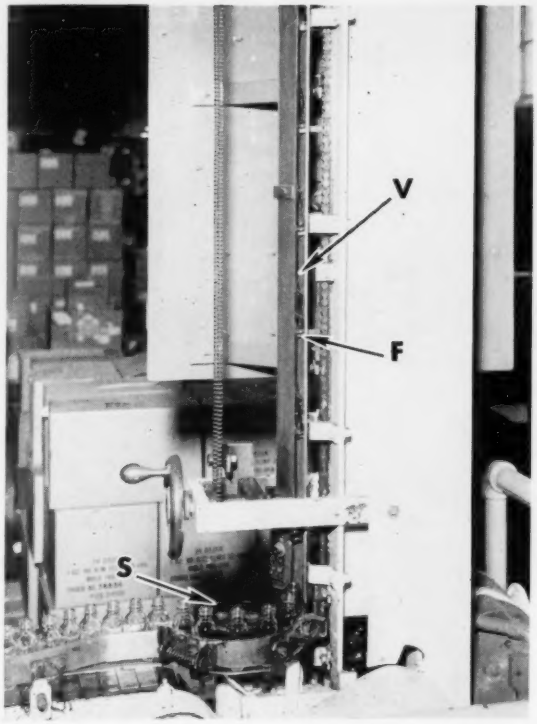


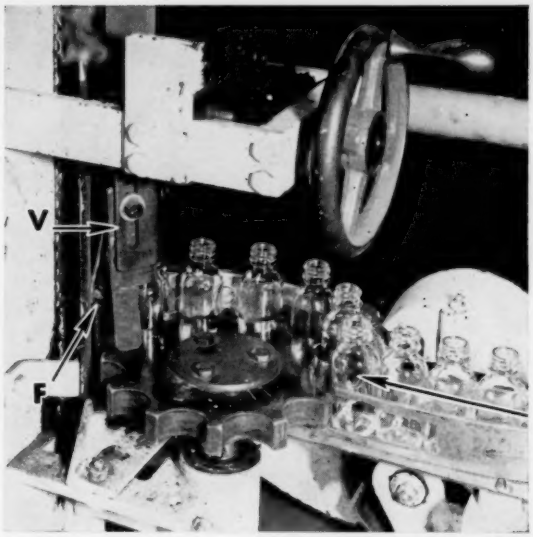
KEEPING SCRAP and carton particles away from packaging line is major reason for unloading empty glass in basement and conveying it to packaging line floor. Leaving unscrambler, bottles move (direction of arrow) to elevator (E) for *upward* trip to packaging line on floor above.

Split-level packaging line saves space, hikes efficiency

By Leland R. Srigley,
Director, Industrial Engineering, Parke, Davis & Company, Detroit

Why not have a three-dimensional, U-shaped packaging line? This question challenged the imagination of Mr. Srigley in his attempt to improve the packaging operations being carried on in a multi-story plant. Putting the case loading and storage on one floor and the unit packaging operation on another struck him as an ideal solution—once a means of moving containers from floor to floor could be found. Only study, plus experience with the economics of the situation, will show how far the company can develop its packaging line in 3-D. But, the first phase of the project shows that the general plan is workable. This may prove that those having multi-story plants need not yearn for single-floor layout. Quite a bit can be done with a multi-story.





CRITICAL TIMING for smooth transfer from lateral to vertical direction was important feature of project. Bottles move with star wheel (S); are taken by fingers (F) to move up V-shaped track (V).

LIFTING FINGER (F) takes bottle from star wheel and moves upward (carrying bottle with) on V-shaped track (V). Fingers are 6 in. apart. Elevator supplies bottles to line operating at 120 bottles/min.

Packaging line mechanization is not just a horizontal concept. It can be as effective when running vertically (from floor to floor) as when installed horizontally on all one floor. This will give you a three-dimensional layout and permits exploiting the advantages of multi-story operations while tolerating the liabilities in such a place.

The starting point of our project was to take a U-shaped layout and open it up, in contrast to the usual practice of letting the two legs of the U terminate at a wall or some other physical obstruction. We put our line in the midst of an open floor area. When you do this, you decrease the amount of travel and inconvenience to the people working on the line. It speeds the work of the mechanics, adjusters, and others who handle and service equipment. This arrangement also assures better maintenance and plant housekeeping.

But successful application of this concept calls for supplying and removing production at either end of the U. At our present stage of project development, our approach is to feed empty bottles to the U through a floor opening—from the floor below.

Keep Packaging Line Clean

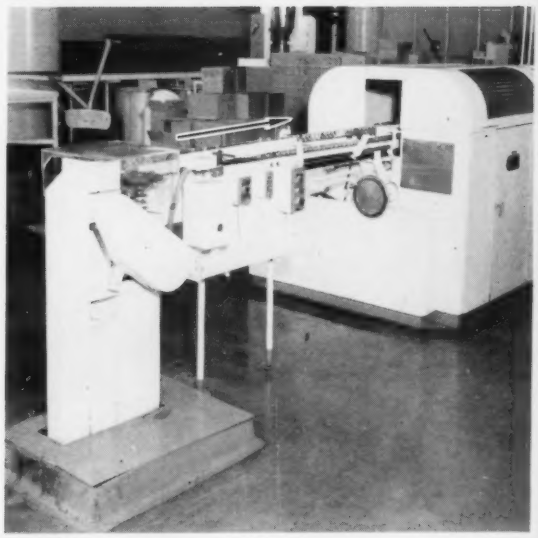
A major reason for the arrangement, as we have it, is to eliminate from the packaging floor as many of the causes and sources of dirt and unsightly appearance as possible. More often than not, these are caused by fragments from corrugated boxes and interior packing partitions, carton scrap, and the like. All these materials are kept on the floor below our filling line. We unload empty glassware on the lower floor and convey merely the empty bottles to the filling floor.

Another point we considered was that we wanted the packaging area to be just that and not, in addition, a zone of warehousing. These two specifications led us to our three-dimensional concept. Since we already had a warehouse area on the floor below the one which would hold our packaging line, plans were formulated to convey the empty bottles from the basement to our first floor. However, we do think that the concept could be just as effective working in reverse.

Avoid Excess Handling

In this connection, however, we would object to upper floor storage of packaging materials and containers in a layout such as ours because it would mean a double movement. First, these supplies would have to be moved up to the first floor storage areas and then again moved back down to the packaging line on the basement level. But, assuming one could avoid such excess movement of ma-

DISCHARGING from top of elevator, bottles move (direction of arrow) to infeed of air cleaner, first meeting star wheel at top of V-shaped track (V). Note difference of star-wheel design for discharge.



SWITCH ON INFEED of air cleaner (right) controls elevator so that it automatically delivers bottles on demand of air cleaner. Bottles move (direction of arrow) through filling, capping, and labeling.

terials, there is no reason why the three-dimensional approach to layout could not work with equal efficiency in either vertical direction.

We looked at all sorts of ways to move containers from one floor to another and chose the straight vertical elevator as the best method to suit our needs. Our objection to conveyors and spiraling devices, which were among some of the alternatives considered, is that they would take up too much space.

In developing equipment, we usually follow a three-step procedure: (1) Use a commercially available or otherwise standard piece of equipment to do the job, if there is one; (2) if no standard unit will work, we take a commercially available piece of machinery and modify it to do the particular job at hand; and (3) if neither a standard nor a modified standard unit will work, our final approach is to explore the design of special or custom-made equipment.

Plan Own Equipment

Finding no equipment we could buy or modify to move containers from the basement to our first floor, our mechanical development department, which is under the direction of Ralph Mottin, was called in on the project. We set up requirements for the equipment needed and then sought a company to build it for us—the Industrial Assistance Company. Our plans and specifications included having the equipment occupy an extremely small area of floor space, machinery with the ability to meet high production line speed, versatility plus adaptability for different bottle sizes, and finally, low cost.

We developed a three-way planning partnership between our production people, our machine development group, and the outside machinery designer and builder to accomplish our aims. We rather quickly agreed on this basic concept: a vertical, V-shaped track with a moving finger on which each bottle (or other container) would rest and which would carry the bottle upward to the packaging line above. The next consideration was to develop an infeed and discharge mechanism.

Boiling down our approach to such specific terms as these saved us a lot of drawing board time and engineering costs. In fact, we carried this phase of the project to a point where schematic drawings could be developed for evaluation. We also furnished specific advice and criticism as the work went along and from these consultations, the present unit was evolved with a minimum amount of revision.

Details Of Elevator

Our elevator consists of a 6-in. I-beam (supported on the basement floor) which goes up about 20 ft. through a 12x12-in. opening in the

(Continued on Page 96)

Leland R. Srigley received his B.S. degree in chemical engineering from Wayne State University in 1939. Starting in the chemical department of Parke, Davis in 1935, he became foreman two years later, and was made senior engineer of the company in 1939. After about four years in the Navy during World War II, Mr. Srigley returned to Parke, Davis and, in 1947, became production and packaging engineer in the finishing division. Five years later, he was made superintendent. In 1959, he was appointed director of industrial engineering. He is a member of the packaging council of the American Management Association.

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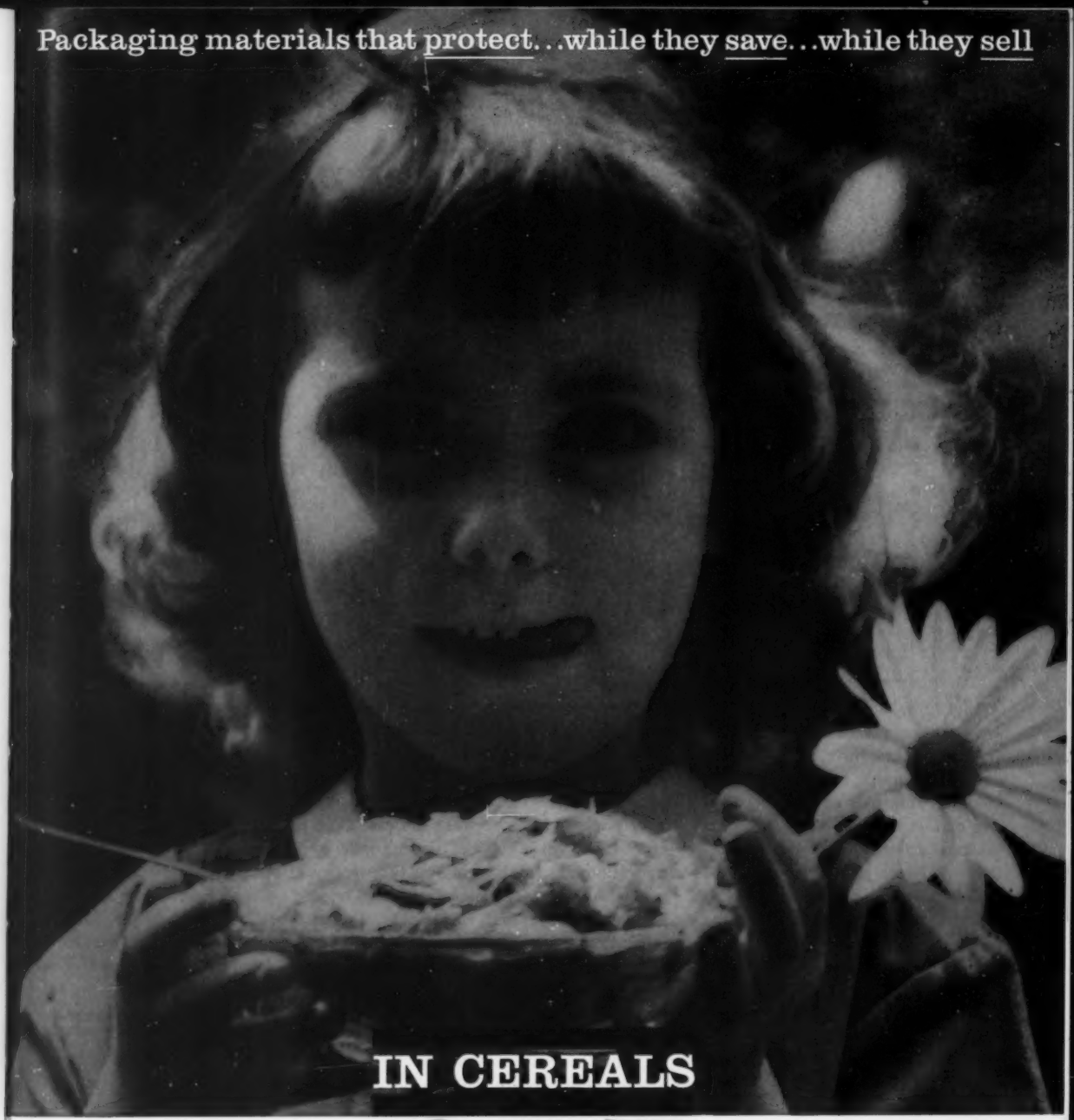

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Part I—Tube-forming and creasing processes in bag machines

Packaging machines cause mechanical stresses in flexible materials

By H.-E. Roder,
Farbwerke Hoechst A. G., Frankfurt, Germany

Rudolf Heiss and G. Schricker,
Institute for Food Technology & Packaging, Munich, Germany

A given packaging material should possess certain properties to allow it to be run efficiently on a particular packaging machine, yet retain its protective qualities. Investigating mechanical stresses in flexible materials (caused by machines), the authors found what material properties are necessary to insure satisfactory performance. In this first part of a three-part article, they discuss processes in bag machines, pointing out the importance of having uniform tensile stress and minimum friction in the tube-forming operation; the influence of machine speed, creasing rate, and importance of time in the creasing process. In the last two parts, the authors discuss bottom folding in bag machines, automatic packaging machines, wrapping machines (twisting, folding), and form-fill-and-seal bag packaging machines.

Packaging materials are routinely tested for mechanical properties, by the manufacturer, before delivery to the user. There are a considerable number of possible testing methods, in addition to which various old and new types of testing machines can be used for individual tests. Thus, the user is understandably at a loss as to the choice of a test method.

Generally, before use, it is desirable to determine which properties must be possessed by a packaging material in order to allow it to be used rapidly and without difficulty in a particular machine. Also, it is necessary that the protective properties of the packaging material (physical strength, and gas and vapor barrier properties) are retained.

Therefore, the object of the present investigation is to single out those processes involving stressing, which, according to experience, cause the greatest damage to packaging materials and which necessitate long machine adjustment periods. On the basis of this knowledge, the mechanical properties necessary to insure satisfactory performance on a packaging machine can be stated.

The investigation covers four types of packaging machines using flexible packaging materials:

1. Bag machines which work from the roll;
2. Automatic packaging machines;
3. Wrapping machines for hard candies;
4. Form-fill-and-seal bag packaging machines.

1. BAG MACHINES

We differentiate between block-bottom, satchel-bottom, side-gusseted, and flat bag machines, according to the type of bag manufactured on them. (See Fig. 1 for bag styles made on these machines.) The block-bottomed bag machine represents the most complicated type, and contains all the most important forms of mechanical stresses of the other types of machine; thus, we can limit our investigations to this type of machine.

A packaging material used on this type of machine travels as follows: Drawn from an endless roll, the packaging material web runs over a printing press and passes segments on the machine where the glue for the longitudinal seams

of the bag is applied. The flat strip is formed into a tube (Operation 1A) by means of a tube former and other devices, and runs through several pairs of rollers which press it flat, thus gluing the longitudinal seam.

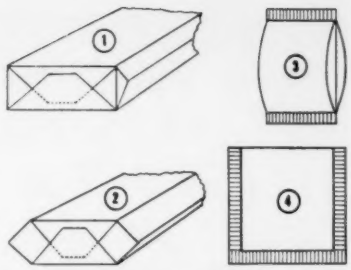
The tube then passes between a pair of rollers where it receives its longitudinal folds (Operation 1B) which should insure that the flat tube does not spring back. Separate pieces of identical length are cut off from the continuous tube and form the structural basis of the final bag.

Transport of the packaging material web up to this stage is effected by pairs of engaging rollers of several centimeter's breadth. The material is thus drawn through the machine by rolling friction (friction transport). One or two blunt knives then press in the transverse creases, Q_1 and Q_2 (see Figs. 2 and 3). This is necessary for the accurate folding of the very complicated bottoms of bottom bags. Longitudinal and transverse creases make possible the mechanical folding of the bag bottom, since the natural elasticity and stiffness are very much reduced in the crease.

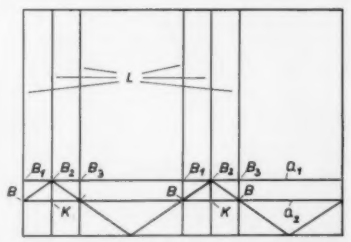
The tube segment is then led onto a rotating roller of about 1 m. (39.37 in.) in diameter, on which the bag bottom is folded (Operation 1C). The bag finally leaves the machine. Operations 1A, 1B, and 1C will now be discussed individually.

1A. TUBE-FORMING PROCESS

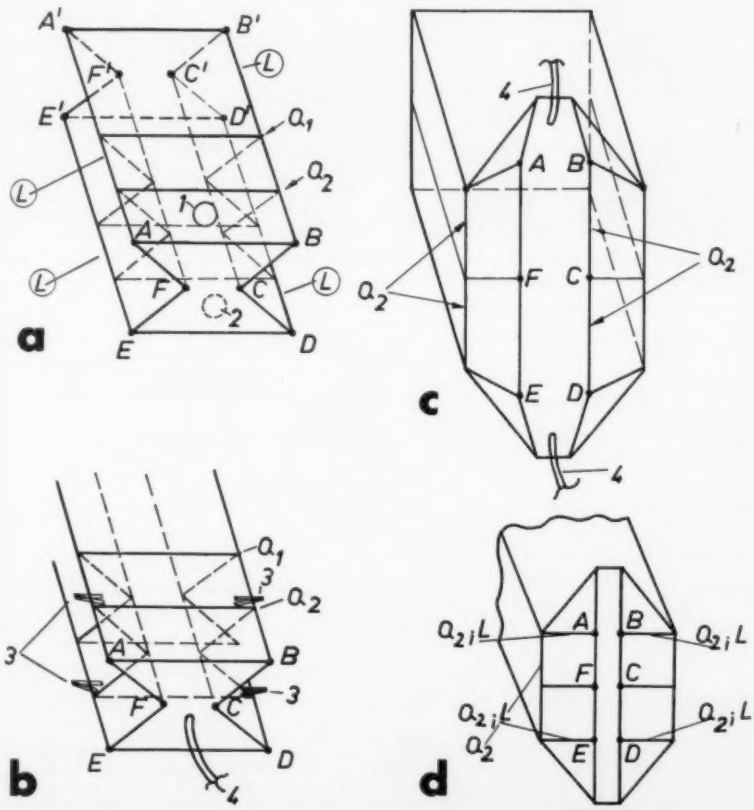
The purpose of the tube forming is to convert the flat packaging material web into a tube, using suitable devices, without damaging the material or causing permanent stretching. Permanent stretching would cause the tube to be no longer true to size. This would lead to difficulties in folding the bottom, which requires dimensional stabil-



1 FOUR STYLES OF BAGS: (1) block-bottom, (2) satchel-bottom, (3) side-gusset, and (4) flat. When block-bottom bag is formed, material is subjected to all of most important forms of mechanical stresses.



2 ARRANGEMENTS OF CREASES in block-bottom bag: L for longitudinal, Q_1 and Q_2 for transverse, B for bag creases, and K for diagonals. All can be reproduced on crease testing apparatus shown in Fig. 10.



3 STEPS IN BOTTOM FOLDING of block-bottom bag after longitudinal creases, L, are made: (a) star-shaped section forms when suction cups, 1 and 2, pull their respective bag surfaces apart; (b) clips, 3, grip longitudinal creases—upper pair holds upper bag surface firmly while lower pair moves downward, changing star-shape into rectangle; (c) bent steel flaps, 4, change rectangular section into six-cornered shape; (d) top and bottom flaps fold inward about two coinciding creases, L and Q_2 (Q_2; L), as axes, bag leaves machine; (e) finished bag.

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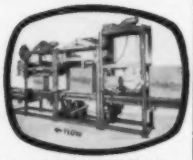

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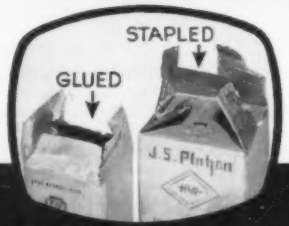

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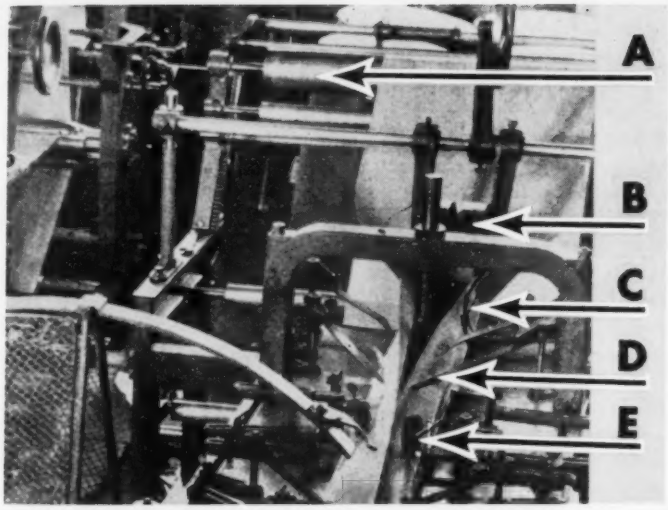
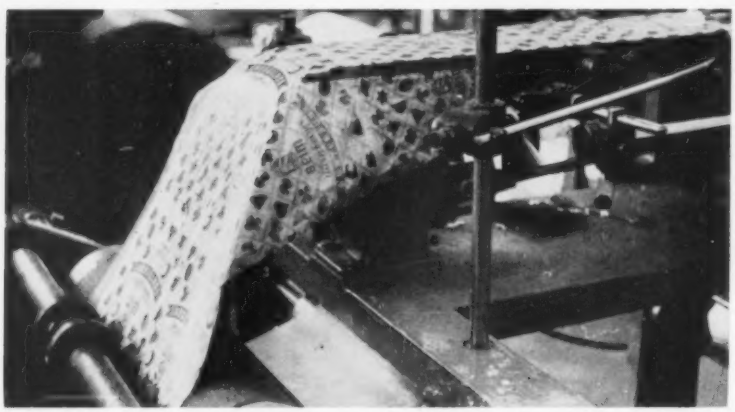
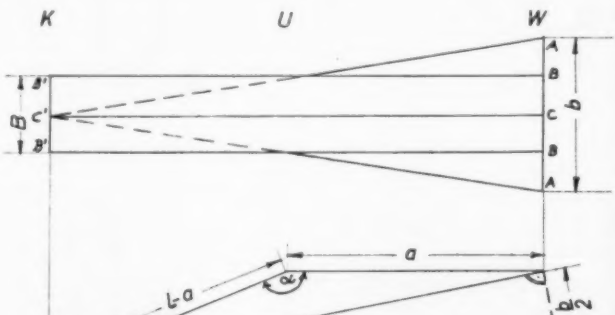


4 **CYLINDRICAL TUBE FORMER,** B, (positioned at U in Fig. 6) forms flat web into tube, as web comes from feed roller, A, (positioned at W in Fig. 6). Operation is aided by several auxiliary devices: round bars, C, steel flats, D, and rolls, E.



5 **BENT GUIDE PLATE** may be used to form flat web of flexible packaging material into tube; in such instance, constant folding angle (a in Fig. 6) is given by bending of sheet.



6 **SIMPLIFIED GEOMETRICS** of tube-forming operation in packaging machine, in plan, (upper portion) and elevation (lower portion). W is position of last feed roller, U is position of tube former, K is position of pair of rollers, B is bag width, L is turnover length, b is web width, a is turnover angle.

ity. In practice, it has been attempted to solve the problem in the following manner (see Fig. 4): The flat material is drawn from the last feed roller, A, and runs over a so-called tube former, B, for example, a pulley as in Fig. 4, or a bent guide plate as in Fig. 5. The width of the tube former is equal to the width of the tube to be formed.

Due to the frictional transport, a tensile stress results in the web in the machine direction. This stress causes the portions of the web passing to the left and right of the tube former to stand up nearly vertically to the plane of the center portion, since they are not guided by the tube former. Since, to form a tube, it is necessary for the edges of the strip to be folded through 180°, the operation is aided by several auxiliary devices, for example, round bars, steel flats, and rolls (see C, D, and E, in Fig. 4).

The tube-forming process is completed when the glue seam is closed by the tube running through a pair of rollers (K in Fig. 6). The total length between W and K, over which the process takes place, will be termed *turnover length L*. The angle between the flat and the tube-formed web will be termed, henceforth, *turnover angle a* (see Fig. 6).

Have Uniform Tensile Stress

Under the influence of tension on the web in friction transport, tensile stresses are set up in the web, due to the tube former and the auxiliary devices. These stresses can lead to permanent stretching and tears. On a machine which is not adjusted in an optimum way the stresses are the greater, the higher the machine speed and the acceleration during the start. For these reasons, it is endeavored to carry out the tube forming in such a way that, with minimum use of apparatus, a uniform tensile stress at every point in the web is achieved, the direction of which shall always run parallel to the middle line of the web.

(Turn page)

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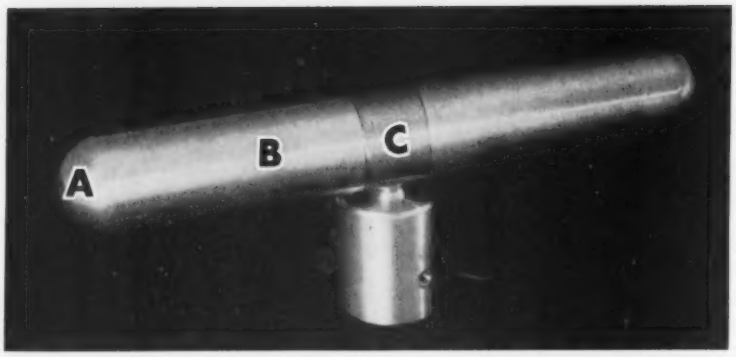

7 CYLINDER WITH HEMISPHERICAL ENDS mounted on ball bearings to reduce friction to minimum, is tube former (at U in Fig. 6) which allows web of material to align itself in accordance with Equations 1 and/or 2 (see text). A is hemispherical end surface, B is cylindrical middle portion—containing bearings—C is stud for mounting former to bag machine.

In an extensive investigation *(2)*, it was established that this desired uniform stressing can be achieved, provided the following conditions are fulfilled:

If the width B of the bag and, therefore, the web width b (Fig. 6) are varied, while the turnover length L (which is fixed by the design of the machine) is constant, the turnover angle a must be set in accordance with the following relationship:

$$\text{Cos}^2 \frac{a}{2} = \frac{b^2}{16a\,(L\text{-}a)} \qquad (1)$$

where a is the distance of the cylindrical tube former U from the last feed roller. If, for the sake of clearness and symmetry, a is put equal to $L/2$, so that the tube former lies in the middle of the turnover length L, the equation reduces to

$$\text{Cos}\,\frac{a}{2} = \frac{b}{2L} \cdot \qquad (2)$$

Uniformity of the stress distribution is only guaranteed by Equations 1 and 2 provided the web is not prevented, because of unsuitable dimensions of the tube former, from aligning itself in accordance with Equations 1 and/or 2. In order to fulfill these conditions, we chose a cylinder with hemispherical ends as a tube former (see Fig. 7), the diameter of which was 3 cm. (1.18 in.), with a total length equal to the width B of the bag. As was confirmed by tests, with a diameter of 3 cm. (1.18 in.), there is no danger that the web will be either impeded due to too large a diameter, or pierced under the influence of tensile stresses in the strip due to too small a diameter.

Reduce Friction To Minimum

It is reasonable for stresses to occur in the web during tube forming because of the fact that the web is retarded by frictional forces due to the application of too many elements. Therefore, in order to maintain a certain web speed through the machine, the tensile forces which draw the web through must be increased. In the assembly shown in Fig. 7, the friction was reduced to a minimum by mounting the end pieces of the cylindrical tube former on ball bearings.

In deriving Equations 1 and 2, we assumed that all imaginary lines in the web run parallel to the middle of the web and furthermore are straight. For reasons of continuity, this cannot exactly hold true. For example, in front of the last feed roller W, the edge of the web runs *parallel* to the axis of the machine, whereas, on leaving the feed roller, it describes a straight-line path at a *slant* to this direction. At the transition, the packaging material is bent into the new direction, so that a greater stretching must take place at this point.

Watch Bending Stiffness

The greater the resistance the packaging material has to bending, the smaller the region of this increased extension will be; but, the actual amount of the extension will be greater. For example, in the case of papers or aluminum foil which

Rudolf Heiss studied mechanical engineering at Munich and received a doctorate from Karlsruhe in 1930. He was formerly associated with the Institute for Refrigeration Technology at Karlsruhe, and in 1936 became director of the Federal Institute for Food Preservation at Karlsruhe. In 1941, he became director of the Institute of Food Technology and Packaging in Munich. Since 1958, he has been professor at the Institute of Technology in Munich for process engineering in packaging and food preservation. Prof. Dr. Heiss is a member of the Institute of Food Technologists and of TAPPI.

G. Schricker received his doctorate in physics at the University of Munich in 1948. He joined the Institute for Food Technology and Packaging in Munich as scientific officer in 1950, and three years later, became chief physicist and head of the Institute's package testing center. Since 1958, he has been assistant director of the Institute (packaging section). Dr. Schricker is a member of the "Physikalische Gesellschaft in Bayern" and the "Deutscher Normenausschust."

H.-E. Roder studied physics at the Institute of Technology in Munich. He prepared his doctorate's thesis at the Institute for Food Technology and Packaging in Munich, and received his doctorate degree in 1957. Currently, Dr. Roder is concerned with the field of plastics in the department of applied research of Farbwerke Hoechst A. G.

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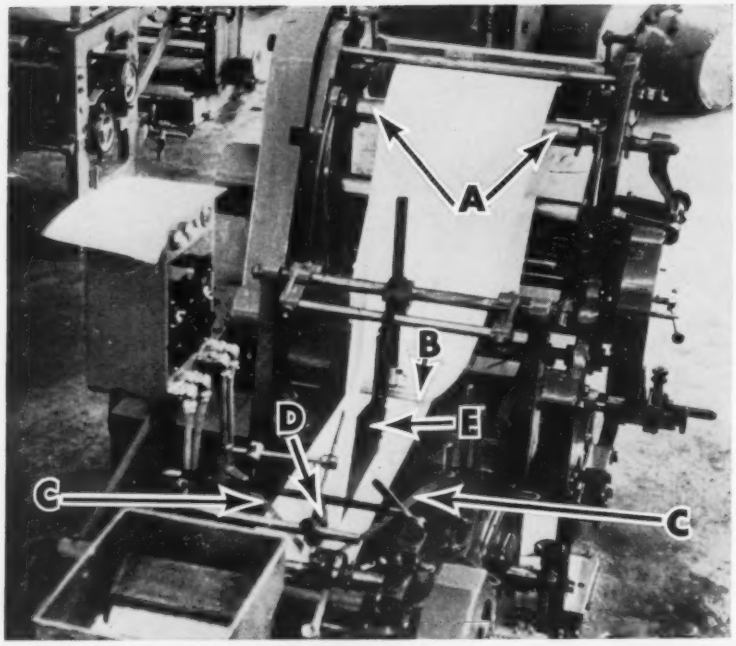
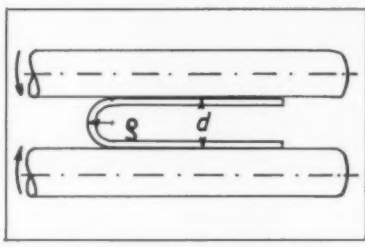
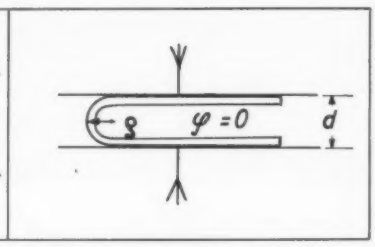


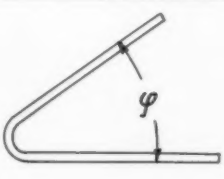
8 **BAG MACHINE WITH TUBE FORMER** shown in Fig. 7, set up in accordance with Equation 2 (see text). At 800 bags/min., machine satisfactorily processed material whose elongation and tear strength had been reduced to low value by perforation. A is last feed roller; B, tube former at U (see Fig. 6); C, steel flat; D, one roller; E, conical sheet guide.



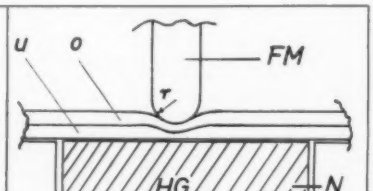
9a **LONGITUDINAL CREASE** which is permanent bending of packaging material through radius of curvature, ρ, is made on bag machine by means of rolls bearing on one another. Distance between rollers is d.



9b **MACHINE-TYPE CREASES** are produced on testing apparatus. ρ is radius of curvature, d is distance between cheeks, φ represents "spring-back" angle which, while material is between cheeks, is equal to 0.



9c **"SPRING-BACK" ANGLE** φ is angle through which legs of folded sample spring back from position in Fig. 9b, within certain length of time, after removal from testing apparatus. Most flexible plastic materials have elastic properties which cause creased sample to spring back certain amount.



9d **TRANSVERSE CREASES** result from creasing knife, FM, of sharpness, r (radius of curvature), pressing material against hard rubber block, HG, in groove, N. The smaller the radius of curvature of knife, the greater will be deformation in crease. Point u is bottom side of bag tube; o is top.

possess a relatively high stiffness and a relatively low elongation at rupture, there is a danger that, at the point of transition of the packaging material into the new direction, a permanent elongation or rupture will occur. Therefore, in order to achieve trouble-free operation, it is advisable to take care that the bending stiffness is not too great in the case of packaging material of low elastic extension or low elongation-to-rupture.

The flat bag machine in Fig. 8 was fitted with the tube-forming device shown in Fig. 7 and set up in accordance with Equation 2. A paper of medium quality, which was provided with a transverse perforation to enable the individual bags to be separated from the tube, was used as a packaging material. The output of the machine (800 bags/min.) showed that even a packaging material, the elongation and tearing strength of which have been reduced to a relatively low value by perforation, can be processed satisfactorily, using the right tube former and a suitably adjusted machine.

Summing up, the mechanical properties required of a packaging material suitable for tube forming on bag machines can be defined as follows:

a. Not too high a flexural stiffness—to avoid points of large elongation in turning over;
b. Relatively high elasticity and high elongation at rupture—to avoid permanent extensions and ruptures;
c. Relatively high tearing resistance—to prevent tearing in turning over.

The requirement (b) for a high elastic elongation is not compatible with the conditions for creasing (Operation 1B); so, in the overall consideration of the packaging material properties necessary for satisfactory processing on bottom and side-gusset bag machines, it must be neglected. As mentioned earlier, this is possible with suitable machine design and adjustment.

1B. CREASING PROCESS

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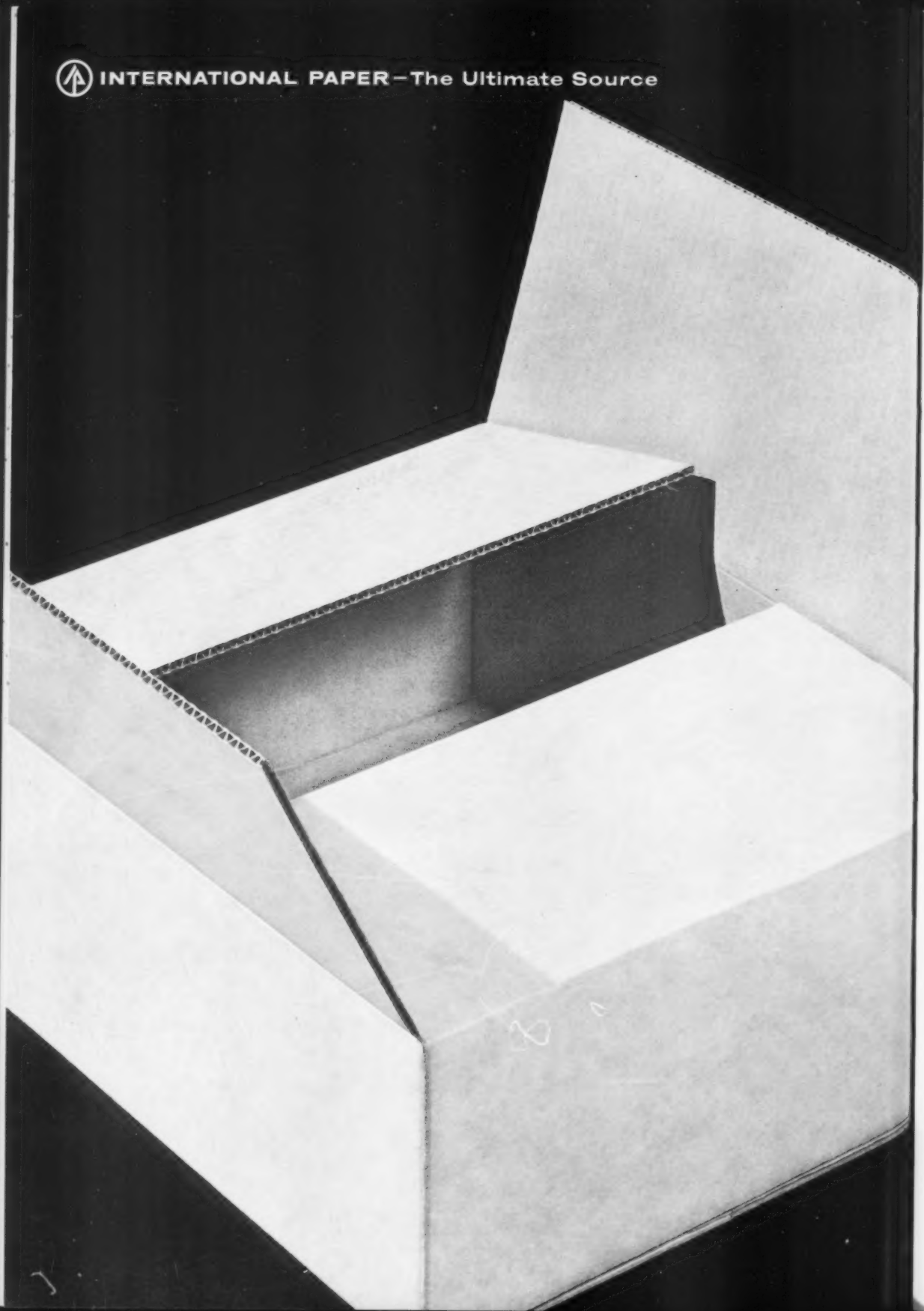
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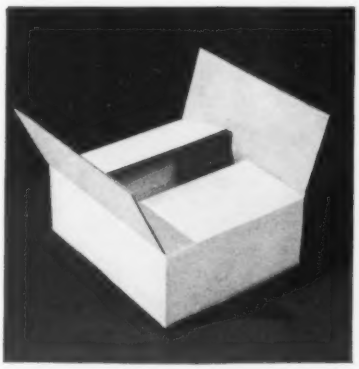

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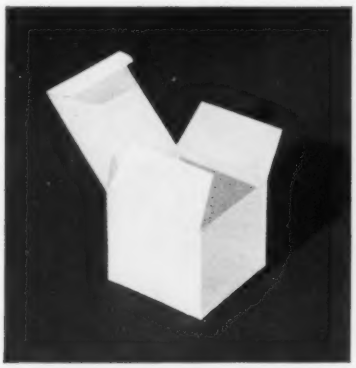

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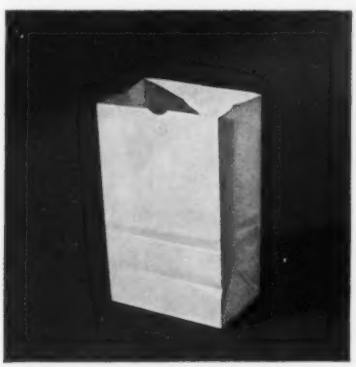

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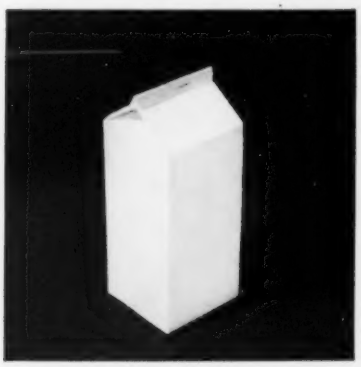

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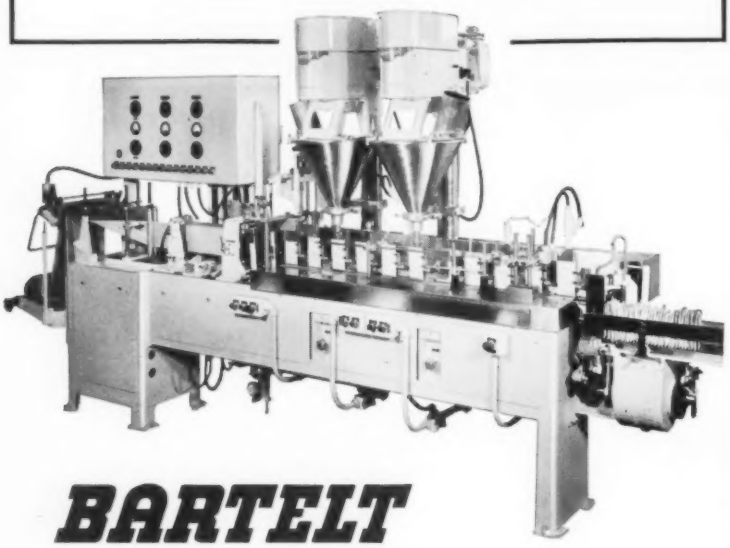

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that various types of creases occur on bottom bags. These are the simple crease (longitudinal and transverse) and intersections *between* longitudinal and transverse creases, which are generally termed "multiple creases."

Simple Creases

Stressing imposed in the formation of longitudinal creases will be discussed in order that conclusions may be reached concerning the relationships for transverse and multiple creases.

The longitudinal crease represents a permanent bending of the packaging material through a radius of curvature ρ *(3)*. Figs. 9a and 9b show how the process is carried out on the machine and how it can be reproduced on a crease testing apparatus. In the former case, the crease is formed while passing through two engaging rolls; in the latter case, by laying the test piece between two parallel platens.

The setting of the radius of curvature ρ influences two quantities which have an important effect on the quality of the product: (1) the resilience (spring-back angle), and (2) the protective effect of the packaging material as represented by strength and barrier properties.

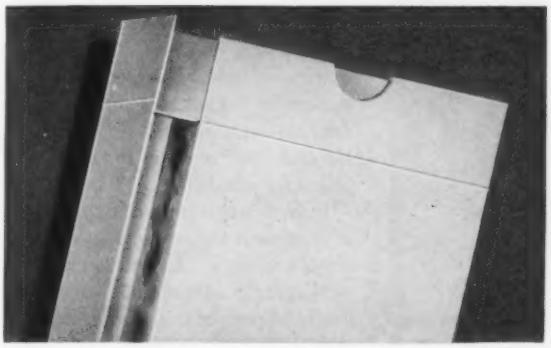
If the packaging material is ideally plastic, the test piece will remain folded in the condition shown in Fig. 9b after removal from the bag machine or test apparatus. This is the case, for example, with aluminum foil. Most packaging materials, however, exhibit elastic properties which cause the creased sample to spring back a certain amount on extraction from the apparatus, as shown in Fig. 9c. The angle through which the legs of the folded sample spring back from the position shown in Fig. 9b after a certain time t is known as the *spring-back angle* ϕ.

Partial Spring-Back Undesirable

The creasing process is intended to give the packaging material a permanent shape after the deformation on the machine, so that even a partial elastic spring-back

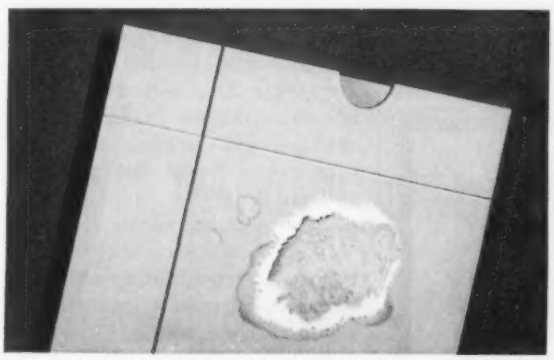
4 COMMON PROBLEMS IN BOXMAKING

(and how the Arabol man helps you solve them)

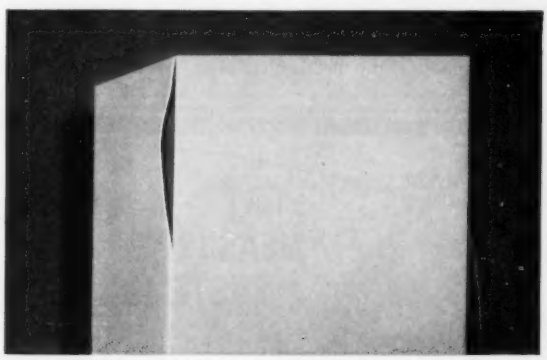


1. THE SIDE SEAMS WON'T HOLD — Embarrassing behavior, to say the least. And many things can happen to your box *material* to cause it. The Arabol man will look for changes in board surfaces, clay coatings or foil. He'll question your inks, waxes and plastic films. He'll check to see if your board is too dry or too moist — both contributing factors. Whichever it is, count on your Arabol man to pinpoint the difficulty quickly.

2. THE ADHESIVE SQUEEZES OUT — This unsightly mess also carrics a troublesome side-reaction: the adhesive can accumulate on the pressure belt, marring your boxes and spoiling your printing. Could be you're simply applying too much adhesive. Or, you may need a *faster-drying* adhesive. Or, one of different viscosity. As another possibility, the adhesive may be building up on the rollers or transfer mechanisms. Why delay? See the Arabol man.



3. THE ADHESIVE THROWS — When this happens, your boxes stick together (and *t-e-a-r* apart) or glue spots appear on the surfaces. The culprit is usually glue viscosity; it's either too high or too low initially. Or running your machine at high speeds may have changed it. You'll probably need an adjustment in the adhesive formulation. Talk it over with the Arabol man. He'll see that our laboratories understand the problem fully—and solve it neatly.



4. THE FINISHED BOX POPS OPEN — This can be costly, because it usually happens when the box is on the customer's shelf. We can suggest at least four possible reasons: (1) unusually high or low humidity; (2) ditto with high or low temperatures; (3) pressure of stacked boxes is causing cold flow; or (4) a chemical reaction is taking place between the adhesive and the contents of the box. Solution? Turn the problem over to the Arabol man.

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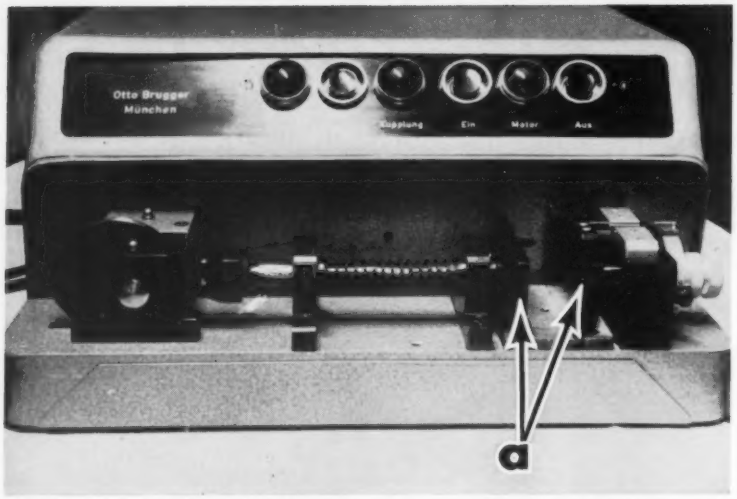

10 **DYNAMIC CREASING APPARATUS** reproduces creases made on bag machine. It consists of two cheeks, a, guided parallel to one another. One moves forward and backward at constant velocity; other is adjustable, assuring definite radius of curvature of material.

to the original position is generally undesirable. It can lead not only to the drawing apart of the gum seam, but also makes the neat folding of the bottom impossible, insofar that, if the position of the packaging material alters, damage to it may result from the engaging tools which complete the shaping —either not grasping it or grasping it incompletely. Mechanisms which bring a resilient packaging material to a condition corresponding to that of a material of negligible resilience make the machines more costly, hinder rapid feeding of the material, and produce undesirable frictional and electrostatic charging effects.

The requirements which must be met by the mechanical properties of simple, multi-layer, and coated packaging materials, in order to achieve suitable resilient properties, are discussed in detail in the literature cited *(3)*.

In order to achieve a minimum of resilience and, therefore, a favorable condition for processing a packaging material, the user generally adjusts the creasing rolls to the minimum possible gap distance. Deformation of the material (elongation on the outside and compression on the inside) increases with decreasing radius of curvature, and therefore grows continually nearer the point of rupture. This results in a deterioration of the protective qualities of the packaging material along the crease line. Thus, a favorable compromise must be made between resilience and retention of the protective qualities of the packaging material during use.

To do this, the radius of curvature is chosen such that the resilience is still tolerable while the deterioration in barrier qualities is not excessive in relation to the protective requirements defined by the nature of the filling. Compromise between resilience and weakening of the material is easily effected, provided the packaging material possesses the necessary properties, namely, small elastic and large plastic deformation (see summary to Section 1A). This results in a slight resilience, and an elongation-to-rupture of more than 100 per cent, if possible under the pertaining operating conditions (moisture and rate of speed).

Measure Influence Of Speed

In regard to the changing machine speeds during operation, the influence of the speed of creasing on the creasing process must be

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measured. For this purpose, a crease testing apparatus *(3)* was built, with which feed velocities can be varied continuously between 0.5 and 31.5 cm./sec. (0.2 in. and 1 ft./sec.) These correspond to the range of velocities normally encountered in practice. The apparatus* (see Fig. 10) consists essentially of two cheeks guided parallel to one another. One executes a forward and backward motion at constant velocity, while the second is adjustable. Thus, a definite radius of curvature of the packaging material is assured. The adjustable feed rate $d\rho/dt$ is provided by a variable speed drive whose torque is transmitted through a cam to the cheek. Single forward and backward motion is achieved by means of a relay-controlled coupling brake unit.

Velocity of movement on the crease testing apparatus, necessary to reproduce the rate of creasing in forming longitudinal creases on a bag machine, is estimated as follows:

Directly after forming, the tube has a radius of curvature (related to the central plane of the packaging material) of $\rho = 1$ cm. (0.4 in.), whereas, after the most acute creasing in the creasing rolls, it assumes a radius equal to half the thickness of the material (δ). The distance s over which the reduction of radius takes place, depends on the design of the machine and will be 30 cm. (about 1 ft.) in our example. In addition, let $\Delta\rho$ be proportional to the distance. The web velocity v will be taken as 50 m./min., or, 5,000 cm./min. (164 ft./min.). This corresponds to an output of 200 bags/min. at a bag length of 25 cm. (9.84 in.).

From these data, we have

$$\frac{d\rho}{dt} = \frac{\Delta\rho}{\frac{s}{v}} = \frac{1}{\frac{30}{5000}}$$

$$= 166.7 \text{ cm./min.},$$

where $\Delta\rho \approx \rho = 1$, because $\delta \ll 1$.

Converting to cm./sec., we have

$$166.7 \times \frac{1}{60} = 2.8 \text{ cm./sec.} \quad (1.1 \text{ in./sec.})$$

The rate of creasing in the formation of the longitudinal crease on this bag machine is thus about 3 cm./sec. Therefore, we can determine simply the approximate rate of creasing, form the crease with the testing apparatus, and measure the weakening of the material in respect to strength and tightness.

Effect Of Creasing Time

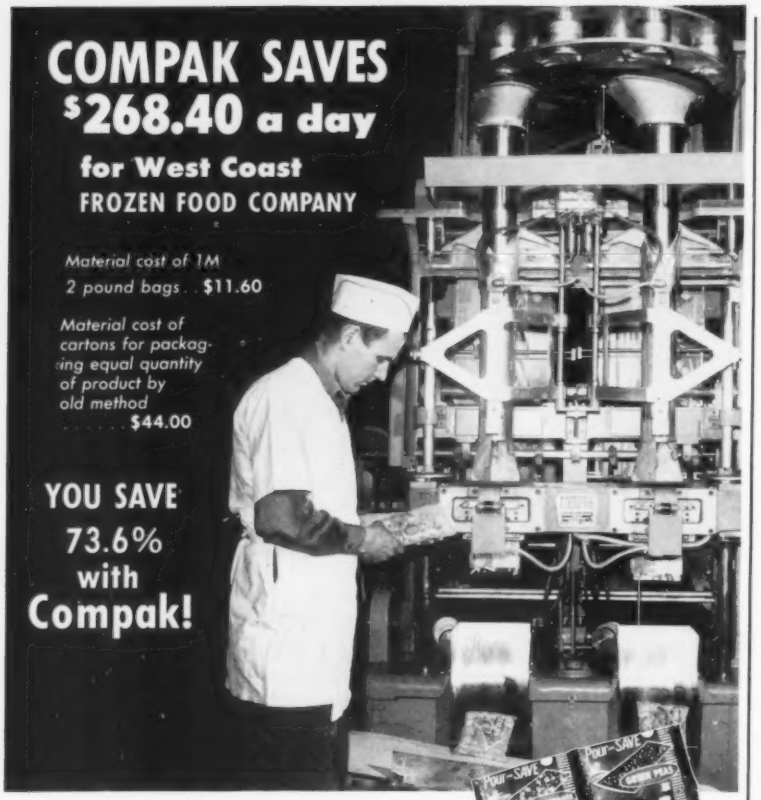
A further quantity which has an influence on the effectiveness of the creasing is the crease duration; that is, the period of time during which the creased sample is held at the smallest radius of curvature ρ. A crease duration in this sense does not occur during the creasing process in packaging machines since there is only a time period of less than 1/100 sec. between the forward and backward motion of the creasing apparatus. Thus, crease duration can be neglected.

The time period for our creasing apparatus is also in this order of magnitude, so that it may be deemed to be representative of practice. Under simplifying assumptions in the work on creasing of packaging materials *(3)*, we calculated that, even in creasing at the minimum possible radius of curvature, the maximum elongation which occurs is about 100 per cent. Under the practical conditions of creasing, however, still higher values of elongation-to-rupture may occur.

Creasing Rate Important

Among the conditions of creasing, pay particular attention to the *rate* of creasing. An increase in the rate of creasing is not infrequently associated with a decrease in the elongation-to-rupture of the packaging material. For this reason, it may be that packaging materials, which suffer no damage or very slight damage under low rates of working, no longer prove adequate at high rates of working. Changes

*The dynamic creasing apparatus is commercially available. Information can be obtained from the Institute of Food Technology and Packaging, Munich 54, Schragenhofstrase 35, Germany.



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in the characteristics of creasing with changes of moisture content are also possible. For these reasons, it is necessary before use, to test the packaging material under relevant conditions of use (radius of folds ρ, moisture content, rate of creasing) in order to assess its suitability.

Multiple Creases

The second type of crease met with on bag machines is the transverse crease. As may be seen from Fig. 9d, transverse creases result from the pressure of a creasing knife of a certain sharpness [radius of curvature of the knife edge about 0.5 to 2 mm. (0.02 to 0.08 in.)] on the packaging material tube in a transverse direction to the machine axis. A hard rubber block, held in a groove, is used as a counter bearing for the knife. The smaller the radius of curvature of the knife edge, the greater the deformation in the crease will be. The two transverse creases, Q_1 and Q_2, which are pressed in turn (see Figs. 2 and 3) are only intended to eliminate the natural elasticity and stiffness of the packaging material at the crease. This facilitates the bottom folding.

Weakening of the packaging material due to the transverse creases is slight, so that a simulation of this does not appear to be necessary. A weakening of the material only occurs when, in forming the bottom, further creases are formed in creases Q_1 and Q_2 which, however, are not formed by pressure but by bending as in the case of the longitudinal fold.

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(3) Schricker, G., Roder, H.-E., and Heiss, R., "On the behavior of packaging materials in creasing, in the manufacture of soft packings," *Chemie-Ingenieur-Technik*, 31 (1959) No. 10, pp. 633-642, (in German).

(Part II of this article will appear in our next issue.)

DOW

Plastiatrics in packaging

DOW'S CLINICAL APPROACH TO HEALTHY PLASTICS APPLICATION

LONG-TERM STRENGTH SHOULD BE CONSIDERED IN DESIGNING A CLOSURE

Thermoplastic closures will not fail or crack in long-term use unless the designed application torque is exceeded.

Plastics, like all other materials, are subject to a phenomenon under stress known as "creep," "cold flow" or "stress relaxation." This means that if the material is free to act under stress, its dimensions will gradually change resulting in "creep" or "cold flow." On the other hand, if the part is originally and deliberately deformed to some predetermined shape and then restrained so that total deformation will neither increase nor decrease, then a second phenomenon known as "stress relaxation" takes place.

It is stress relaxation that takes place in a closure when it is applied to a bottle under torque conditions. The amount of stress relaxation occurring in a part is dependent first of all on the material itself. One type of plastic will be more susceptible to stress relaxation than another. In addition, the temperature, the magnitude of the applied load and the length of time the part is under stress will also determine the rate and extent of stress relaxation. Because of stress relaxation, the removable torque of a thermoplastic closure will gradually decrease as time goes by. Also, if excessive stress relaxation takes place, failure can occur in the closure. Therefore, the designer must know the limits of stress relaxation the plastic material can tolerate without failure.

In view of this situation, Plastics Technical Service of The Dow Chemical Company inaugurated a program about two years ago to develop design data as shown in Figure 1. Data are plotted for both a general purpose polystyrene and a rubber-modified polystyrene. These data point out that the rubber-modified materials will withstand higher stresses for longer periods of time than will a general purpose material. From this type of data, it has been possible to calculate design strains for a number of Styron® plastic materials. These design strains (Figure 2) tell the designer exactly how much distortion or strain the material can be subjected to for a given period of time without failure.

Through use of strain gauges, it has been possible to measure the maximum strain that occurs at various points in a closure when it is placed on a bottle. Figure 3 shows a plot of these data for two different closures made of Styron 330. Since the design strain of Styron 330 is 0.26%, the maximum safe application torque for Cap A would be 29 inch pounds, and for Cap B, 23 inch pounds. Under short-term testing these same caps would take nearly 100 inch pounds of torque before definite breakage would occur. Therefore, it is very important to know the long-term strength behavior of a plastic material in order to get the best strength-to-weight ratio and to insure success of a closure under long-term loading.

Dow will be glad to assist designers and manufacturers in the selection of plastics materials for threaded closures . . . as well as in other problems relating to plastics for packaging.

STRESS RELAXATION OF STYRON

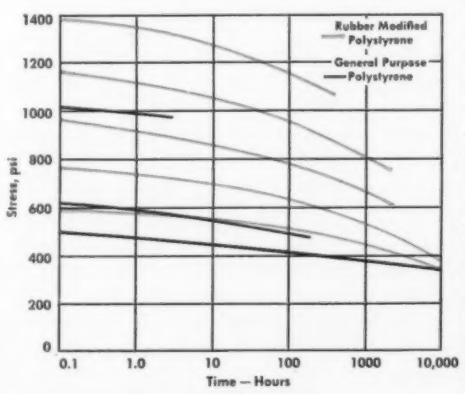

Fig. 1

DESIGN STRAINS OF STYRON FORMULATION

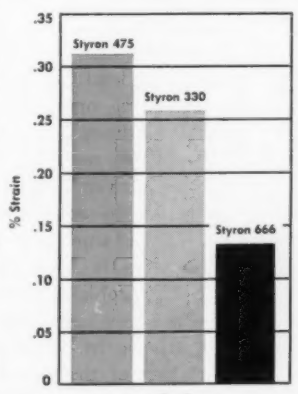

Fig. 2

APPLICATION TORQUE VS. STRAIN FOR CLOSURES OF STYRON 330

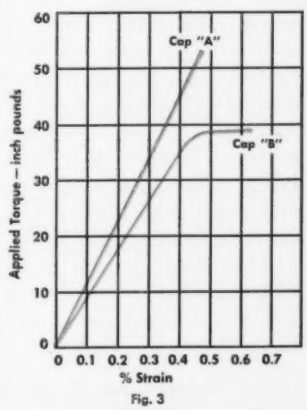

Fig. 3

Dow formulations which may be used for closures are: STYRON 330 • STYRON 369 • STYRON 475M • STYRON 683 • STYRON 666M **and selected Q materials.**

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Harvey Miller attended Elmhurst College and received his B.S. degree in chemistry in 1950. He was with the central laboratories of American Can Co. prior to joining Morningstar-Paisley in 1951. Starting as a chemist in its laboratories, he is now manager of its technical service department.

Adhesive sealing problems— spelled out and cured

By Harvey Miller, *Manager, Technical Service Department, Morningstar-Paisley, Inc., Chicago*

Knowing how to determine the cause of adhesive sealing defects and to cure them—or at least provide stop-gap measures to keep the packaging line running—is important to every user of packaging adhesives. With down-to-earth pointers to help the user gain optimum adhesive performance, Mr. Miller discusses adhesive storage, handling and use, and stresses the importance of purchase specifications. Strongly advocating a good control system for adhesives received by the user, he gives simple tests for checking adhesives under such a program. He provides a chart—a handy reference which can be posted at the machine—of common sealing defects, their causes and cures.

A particular package has been running successfully for two to three months when suddenly, without warning, units begin to arrive at the end of the line with unacceptable seals. Or, one or two hours after leaving the packaging operation, seals that appeared effective at the packaging line are now practically non-existent. Because situations such as these are not uncommon, the packager should be able to determine the cause of the defect quickly and provide either a cure or a stop-gap measure to keep its packaging line running.

Basic Factors For Good Seal

The effectiveness of a seal is generally dependent upon the interrelationship of three basic factors:

1. Specific adhesive used;
2. Method of application;
3. Characteristics of the adherend, particularly of its surface.

External conditions, such as the temperature and humidity during the packaging operation, and the storage conditions to which both the packaging material and adhesive have been subjected, also exert an influence on seal effectiveness.

A statistical study, which we conducted recently, showed that, of ten sealing problems, three are usually caused by mishandling of the adhesive, five by variations in the absorbency of the board or other packaging material, and two by improper adjustments of the packaging machinery. Adhesive mishandling includes temperature variations in the glue pot and poor storage or working conditions that may cause adhesive contamination.

ADHESIVE STORAGE

Adhesive storage conditions will exert a great influence on the production of a proper package at a future time. One extremely important factor, often disregarded, is the perishability of liquid adhesives. The packager should maintain an inventory minimum so that no adhesive remains more than 90 days in storage. One effective way to handle inventories is by utilizing the "first-in, first-out" technique.

Need Proper Temperature

Achieve increased adhesive working life by storing the material in a location with a temperature close to the normal operating tem-

The Importance of Logic in Packaging Machine Design.

The most successful packaging machine is the most simple in concept. Unnecessary complexity invariably taxes itself in speed, performance, efficiency and maintenance.

Triangle originally entered the bag making, filling and sealing field to develop a single tube machine. No other consideration was allowed to complicate the basic requirements. That's why Triangle's single tube machine has been so unusually successful.

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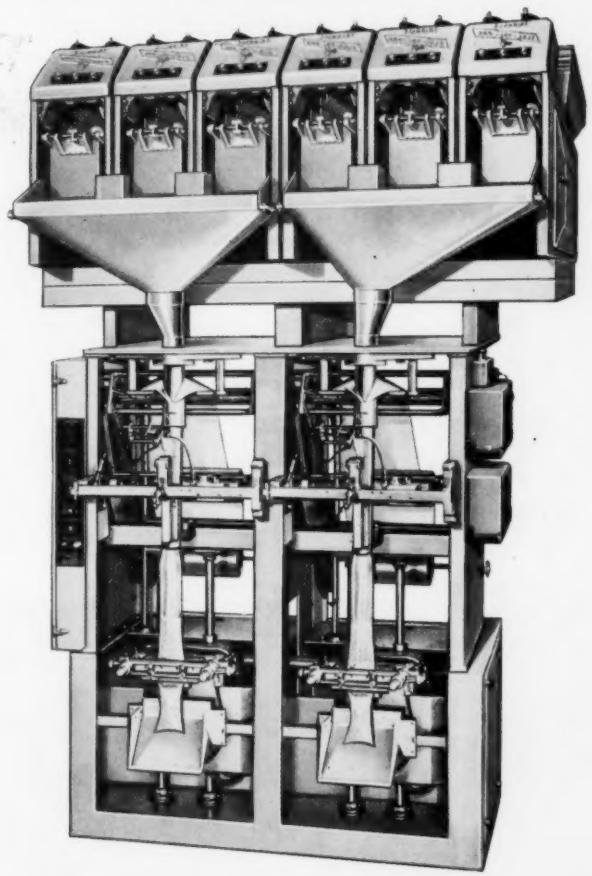
The Triangle Twin is fast . . . 120 bags per minute with any bag material (90 per minute with polyethylene). It will handle a full range of bag sizes up to 8" x 16".

The Triangle Twin is a fully integrated combination of two, efficient single tube machines with one common drive . . . yet sealing jaws operate independently to permit one side to operate while the other side is down for film threading or routine maintenance. This feature results in *less* downtime and more production than normally expected.

The Triangle Twin mounts up to *six* Elec-Tri-Pak net weighing scales on top where they belong. No costly intermediate elevator feed is required. Volumetric filler and other synchronized systems are also available.

The Triangle Twin has all the performance of the time proven single tube bag maker and filler . . . fast, simple changeover for all materials from cellophane to polyethylene . . . quick return jaw assembly . . . simple, functional design of sealing jaws. . .

See for yourself how far the Triangle Twin has advanced the concept of high speed bag making, filling and sealing. Write today—without obligation, of course



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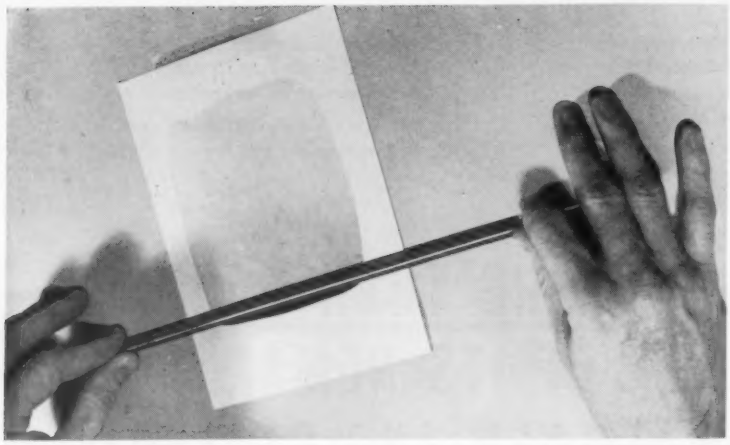
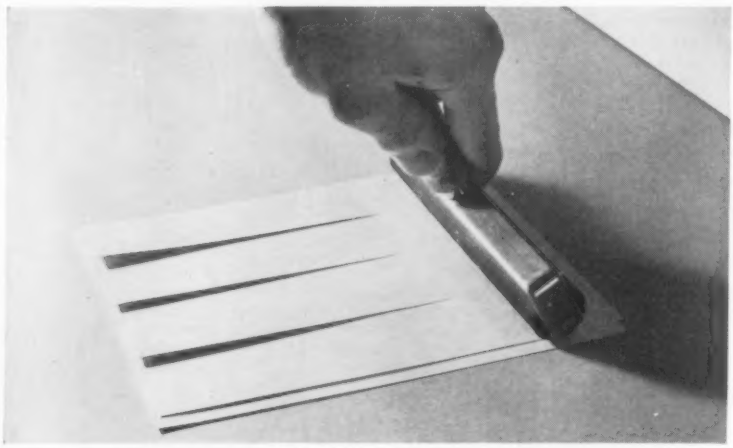


1 **DRAW-DOWN TEST** gauges new adhesive or board stock against standard samples. First step: Apply uniform film of adhesive to board (first adherend) using standard draw-down bar.



2 **PLACE SECOND ADHEREND,** cut in strips, over adhesive. Using roller, apply pressure (between 2 and 3 lb./sq. in.). When compression phase is completed, start stop-watch.

3 **LIFT STRIPS** from board at intervals noted (5, 10, 15, 20 sec.). Note fiber tear, at 20 sec., practically along whole joint. Test shows adhesive setting speed or relative porosity of board.

perature in the packaging area. If storage temperatures differ more than 10°F. from the general packaging area, then, several days before use in the packaging line, transfer sufficient adhesive to a plant location where temperatures are the same as the packaging area.

Have Control System

If the individual adhesive containers are not inspected under a specific control system at delivery, they should receive visual inspection—color, apparent viscosity, evidence of contamination—before going to the gluing room. Have a good control system for adhesives coming into your plant.

HANDLING AND USE

One of the greatest sources of sealing difficulties has been use of concentrated adhesives instead of the ready-to-use liquid type. When an adhesive requires dilution before use, a number of opportunities for error are presented. These include: (1) excessive water, (2) inadequate water, or (3) contamination with other adhesives or materials from the mixing equipment or mixing containers.

Ready-to-use liquid adhesives together with the use of *clearly marked* auxiliary containers will make it practically mandatory to employ the same pails or pitchers for a particular adhesive. Many low-cost polyethylene buckets and containers, which are easily cleaned and inert to most adhesives, have been found very satisfactory.

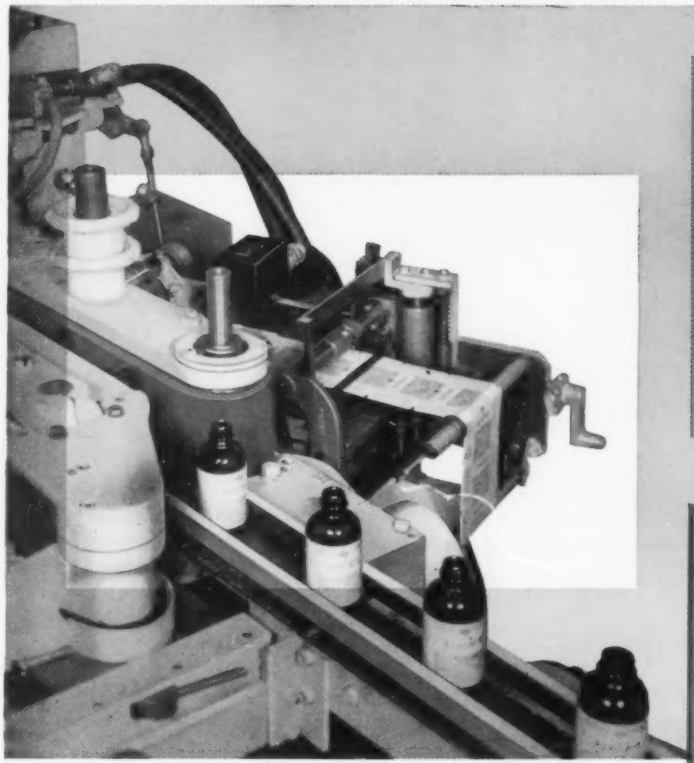
Keep Glue Pots Clean

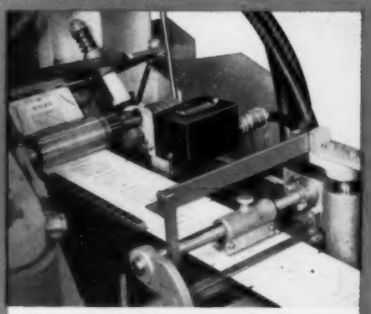
Another important consideration in the handling of adhesives is the condition of the glue pot. Top-notch performance demands that the glue pot, transfer rolls, and transfer plate be maintained in clean and smooth condition.

At the end of each day, glue pots and accessory equipment should be thoroughly cleaned and inspected for worn or defective parts, since optimum setting speed of the adhesive will depend upon the ability of the glue pot equip-

New roll feed "no glue" labeling

Automatic verification, coding, protection and control





Shown here is the imprinting and coding head and electric eye controlled cut-off.

The Label-DRI Challenger complete with electric eye-controlled roll label feed. Speeds up to 120 per minute.

Also available:

The Semi-Automatic Pony Label-DRI. Speeds up to 60 per minute.

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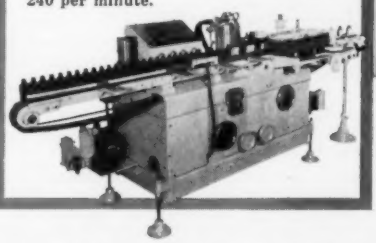

Three New Jersey Label-DRI models now available

You get fast, fool-proof "no glue" labeling with these new roll feed Jersey labelers.

1 **Automatic label verification**—Once the first label has been checked, you know all other labels in the same continuous web must be the same.

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3 **"No-glue" labeling** – Labels in roll form are printed on thermoplastic label stock. You eliminate adhesive coating and are sure of more attractive label application.

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Check the Jersey Label-DRI that's best for you. Ask for details and a demonstration.

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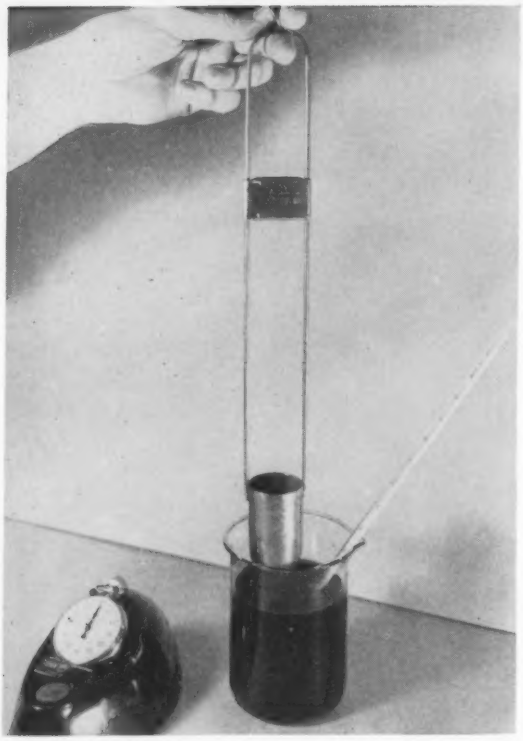
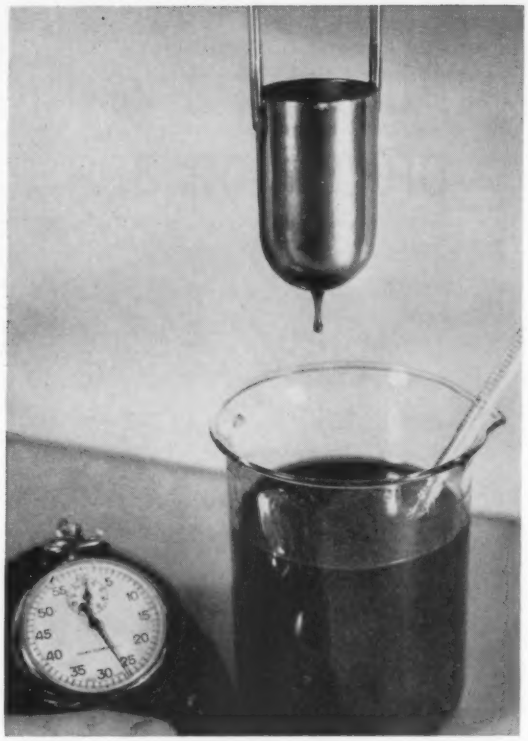


4 ZAHN CUP TEST shows adhesive effectiveness. First step: Dip standard Zahn cup into container of adhesive heated to 85°F. When apparatus is raised above adhesive surface, start stop-watch.



5 STOP TIMER when solid adhesive stream, issuing from orifice, breaks short. In terms of time interval, test may show that adhesive used in faulty package was too high or too low in viscosity.

ment to meter a smooth, continuous, thin film. The application of excessive adhesive will result in increased costs because of adhesive waste and reduction of machine speed.

A number of compounds are available for coating glue pots before they are filled with adhesive. The coating allows easy removal of dried glue films at clean-up time. Some of these are permanent treatments, some are temporary. Examples are silicones, Teflon, and neutral petroleum jellies.

A Cover Helps

A covered glue pot will help keep adhesive contamination to a minimum. In folding box gluing operations, for example, the adhesive in the glue pot is subjected to large amounts of paper dust.

If this contamination is not minimized by a cover on the glue pot, the subsequent increase in viscosity will effectively cut down glue film. A recently developed resin adhesive especially designed for this type of application reduces the build-up of viscosity and greatly increases the working-life of the adhesive.

Use Wet Cloths Overnight

When adhesives must be kept in the machine overnight, the rolls and glue pot should be covered with clean, wet cloths. This prevents skinning, crusting, or bodying-up.

All dilution operations should be performed in an outside container, rather than in the glue pot where proper mixing is difficult. When it is absolutely necessary to dilute an adhesive within the glue pot, use of a thinned adhesive mixture will prove superior to a raw solvent or water.

PURCHASING SPECIFICATIONS

A definite advantage exists in purchasing adhesives by definite specification. In this way, the supplier can control the physical properties to meet extremely narrow limits of exacting specifications.

Consider Variables

Since the sealing process is usually the last finishing operation, the adhesive is often erroneously blamed when a poor seal is encountered. To get at the specific cause of the defect, the packager should also consider a number of other variables, including board stock, temperature variation, contamination of adhesive, improper setting of the glue pot, and inadequate pressure or compression time. These variables are cumulative; when their sum becomes too great, a given adhesive may not be able to provide the necessary seals.

Form "User-Supplier" Team

You may find it helpful to delegate a person or group to work together with the adhesive supplier. This "user-supplier" team can then

set up tests that will indicate compliance with specifications. For maximum effectiveness, the employee or committee should have the authority and responsibility for the selection, handling, and storage of adhesives.

This committee should have available an up-to-date approved adhesive list and should recommend one or two adhesives for each job. Record-keeping should also be part of the group's function; in this way, you will have information on the adhesive used in every operation.

PRE-TESTING COMPONENTS

Through simple tests made on packaging materials and adhesives as they arrive at your plant, you will be in a position to take effective action when sealing problems occur. Realizing that a particular item will run for a substantial length of time, it will be to your advantage to store away some standard samples of both the packaging materials and the adhesive being used.

Keep Standard Samples

If a defect in sealing should occur, compare the standard samples with the materials used in the defective package. These samples should be drawn when the packages have been running for a sufficient length of time to indicate that both the packaging material and the adhesive are satisfactory. Approximately two dozen small cartons or other packages being produced and a one-pint sample of adhesive should be adequate as standard samples.

Replace the samples every two months to eliminate changes in the board during storage. The board samples should be stored in a location with a relatively constant temperature and humidity, and where conditions closely approximate those in the packaging area. An ideal area would be a standard conditioning room; laboratories are also satisfactory places in which to store these standard sample materials.

TESTS TO FIND DEFECT CAUSES

Two simple tests can be performed at your plant to gauge new materials against the standard samples. These tests consist of a drawdown test and a Zahn cup measurement. Results of these tests performed on standard samples of board and adhesives will indicate

CHART

Packaging Adhesive Sealing Defects—Causes And Cures

Defect	Causes	Cure
Starved glue line	Applicator clogged by contaminated adhesive	Clean applicator and glue pot, and start over with fresh adhesive
	Adhesive viscosity too low (overdiluted)	Clean glue pot and use more concentrated adhesive
	Paper stock too porous	Apply heavier glue film or higher viscosity of same adhesive grade
	In seals between coated & plain board, adhesive is absorbed by plain stock without penetrating the coated surface	Use very slow-setting adhesive or reduce machine speed
Excessive adhesive	Too much adhesive applied	Adjust metering screw to decrease thickness of adhesive film
	Adhesive viscosity too high	Dilute adhesive slightly and adjust machine for optimum film thickness
	Dense board prevents adhesive penetration	Add water to adhesive to assist penetration
Lack of required water resistance (fails water-resistance specs. when water-resistant adhesive is used)	Wet strength of board is too high to allow fiber tear required by test	Pre-test board on gluer before actual production
Uneven adhesive application	Contaminated adhesive	Replace with clean, fresh adhesive
	Worn glue roller (usually becomes eccentric)	Replace roller
Seal opens under heat	Wrong adhesive for application	Replace with proper adhesive
Adhesive not set at end of packaging line	Excessive adhesive applied	Decrease film thickness or dilute adhesive
	Board too dense	Add water to adhesive
Spotty bonding	Inadequate compression pressure or time	Increase pressure or time setting on machine
	Uneven glue applicator, or board has uneven absorbency	Increase adhesive application
	Worn glue roller	Replace roller
Seal opens at high humidity	Adhesive is sensitive to moisture	Change to proper resin adhesive

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what should be expected of acceptable materials. When a sealing defect occurs in the future, the material contained in the defective package can be tested to determine the cause of the difficulty.

Draw-Down Test

Draw-down test results are best provided in terms of adhesive setting speed, as indicated by fiber tear at the joints. Standard draw-down bars are available from most laboratory supply houses.

The draw-down test is begun by laying down an adhesive film 6 in. wide on the board (see Fig. 1). For most adhesive applications, the height of the wet film applied should range between 0.002 and 0.004 in.

Immediately, a sheet of paper that has been cut into three or four strips is placed over the wet film and pressure is applied (see Fig. 2). Pressure should range between 2 and 3 lb./sq. in., and the same pressures should be used for all samples being compared.

Also Shows Board Absorbency

The individual strips of paper are then removed from the board at pre-set time intervals; for example, 5, 10, 15, and 20 sec. By noting the condition of the board under each strip, the setting speed and the ability of the adhesive to provide fiber tear can be established (see Fig. 3).

Another section of the sample can be retained until the following day, when final adhesion can be checked. The draw-down test will also provide a visual indication of the absorbency of the board. The latter factor will prove useful in checking for absorbency variations.

The Zahn Cup Test

Adhesive effectiveness can be indicated by a Zahn cup test. Commercial Zahn cup equipment can be purchased for approximately $18. The test is made as follows: A sample of the adhesive is heated to 85°F. The cup is then immersed into the adhesive and filled, then withdrawn. At the point of withdrawal, a stop watch is activited (see Fig. 4).

The time required for the stream of adhesive to break will indicate the viscosity of the adhesive (see Fig. 5). Zahn cups, available at laboratory supply houses, range in intervals between 100 and 2000 centipoises.

This test performed on the adhesive used in a package with defective seals can then be compared with the results on a standard sample. The test may point out that the adhesive used in the faulty package was either too high or too low in viscosity, and subsequently may require a higher concentration or dilution.

KEEPING THE LINE GOING

For the most part, it is possible to utilize stop-gap measures, or provide a complete cure, for the fault so that the packaging line can be kept operating when serious sealing defects occur (see chart).

(Turn page)

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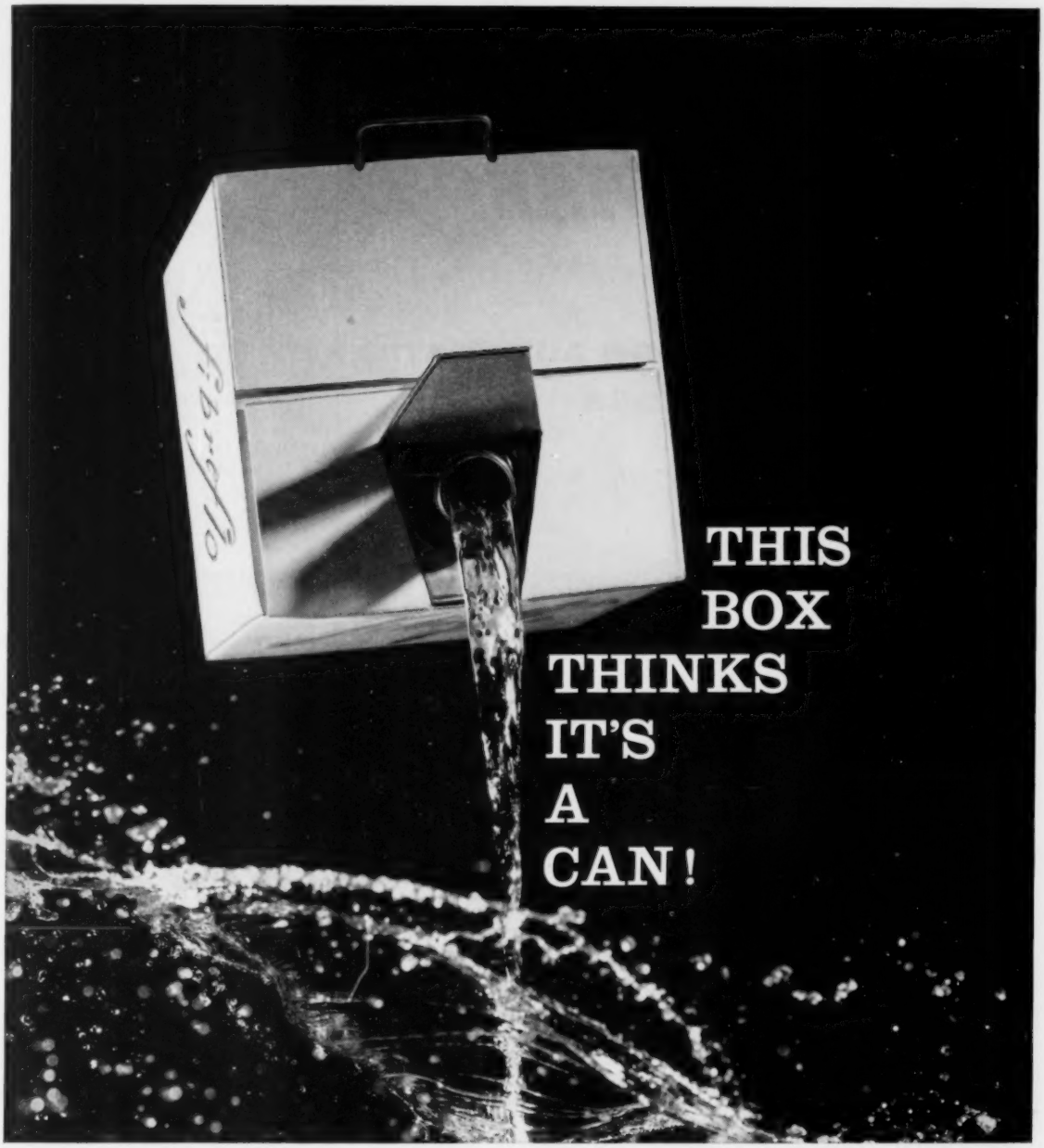

And sometimes it even believes it's a glass jug. Its name: *Fibreflo*. And it holds oils, syrups, chemicals... any kind of liquid. Just like glass or metal. Except that it's much lighter; doesn't break or shatter. The inner secret of its unique personality? A sturdy plastic bag lining with a telescoping spout.

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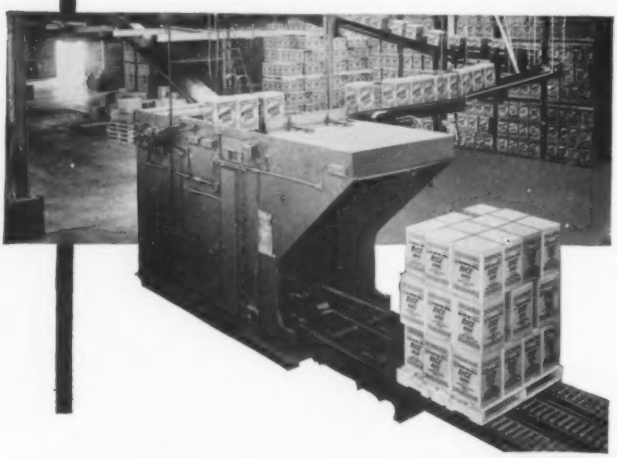

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Starved Glue Line

One common defect is the starved glue-line, where an inadequate film of adhesive is placed on the adherend. Causes may include a clogged applicator in the glue pot, too low an adhesive viscosity, or too porous a board stock.

Often, when seals are made between coated and plain board, the adhesive is quickly absorbed by the plain stock and not applied sufficiently to the coated material because it has set too fast. This condition can be remedied by using a very slow-setting adhesive or by reducing the machine speed slightly. Starved glue lines can also be easily remedied by methods such as cleaning the applicator and glue pot and starting over with fresh adhesive, using a more concentrated adhesive, or applying a heavier glue film.

Watch For Too Much Adhesive

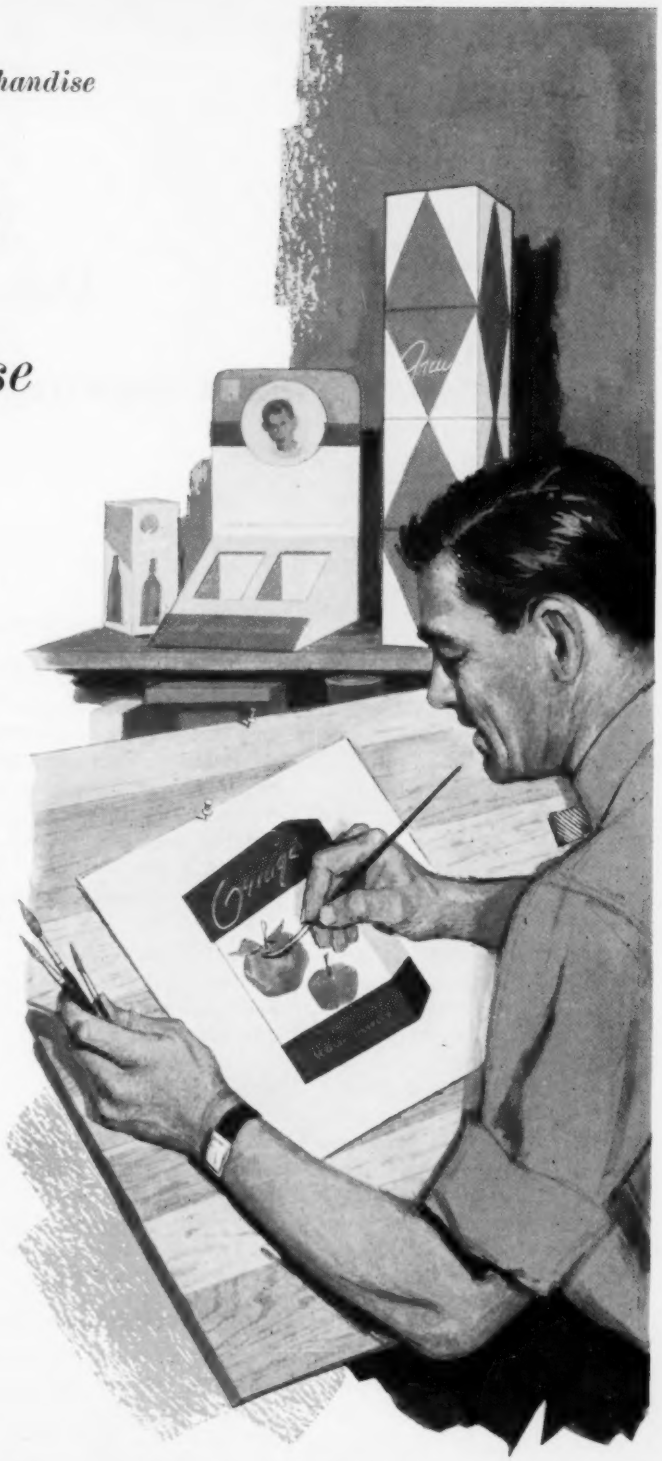
Excessive adhesive laid down on the adherend may be reduced by adjustments to the metering device to decrease film thickness, or by diluting the adhesive. Excessive adhesive will usually cause a poor bond after a 35-sec. compression period where, with proper adhesion, a joint should show 90 per cent fiber tear. Although the application of excessive adhesive will provide tackiness, the setting speed will be too slow for proper bonding at the end of the packaging line, where the joints will slowly pull apart if tested.

Lack of required water resistance is usually not the fault of an adhesive that was selected because of its water-resistant properties. In this case, the wet strength of the board is usually too high to allow the fiber tear required by the test. One way to get around this problem is to pre-test the board on a gluer before actual production is begun.

A number of other sealing defects, and their causes and cures, are shown in the chart. This chart may be used as a ready reference by the packaging machine operators. *(End)*

Planned Packaging moves merchandise

Here's an artist who sells your merchandise



This man and many others like him on Packaging Corporation of America's technical staff devote themselves to *selling your products.* Cooperating with product development and production engineers engaged in constant improvements of packaging materials and methods of all types, they form a *creative team.* Under their skilled hands the container or carton is transformed into a colorful, appealing creation that works for you in transit, promotes its contents from shelves and counters, invites buyers to reach for it. Experimenting with color arrangements, with special inks and a variety of printing processes . . . theirs is a continuing quest for all the ways in which artful package exteriors can sell harder. Bringing this ingenuity to the design of your packaging is but one of countless ways in which Packaging Corporation of America's concept of Planned Packaging, implemented through integrated national facilities, produces better packaging . . . more sales. Whether your requirements are large or small, regional or national, we welcome the opportunity to help you.

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Using large packages without having a packaging line

Furnishing a non-standard package to meet the needs of a particular customer requires ingenuity—to fill the requirement without adding an excessive burden to the existing operation. This company came up with a stapled corrugated package into which its crew members merely dump the contents from its standard multiwall bags. Thus, the company meets its customer's specific need without using additional men or facilities, except for the stapling equipment.

To furnish product in palletized boxes to meet the requirements of a major customer's inplant operation, The C. P. Hall Company of Illinois, Chicago manufacturer and distributor of industrial chemicals, now fills 900 lb. of ground walnut shells in stapled corrugated boxes. Its normal practice is to ship this product, used as an abrasive and deburring material in metal working, in 4- and 6-ply multiwall bags.

Although this company does manufacturing and packaging of products such as fatty acids and esters in steel drums (at another plant in this area), it does no packaging at its distribution warehouse handling the ground walnut shells. Shipping this item in multiwall bags meets the needs of most users which are relatively small establishments in the plating field.

Design New Package

But these bags did not fit in with a major customer's inplant handling system, which contributed to bag breakage. So the Hall organization set up a different package—one geared to the customer system and which required no packaging line at the Hall plant.

Result of experimentation with alternative packages: a corrugated package consisting of a bottom cap, inner and outer sleeves, and a top cap. Material is 600-lb. test double wall corrugated. The inner liner is comprised of A- and B-flute board, with the A-flute board next to the product and the B-flute board to the outside of the inner liner. The outer liner consists of A- and B-flute board, with the A-flute board on the inside and the B-flute board on the outside of the outer liner.

Air Space Between Liners

Package construction provides an air space between the inner and outer liners. This space is just enough for easy movement or sliding of liners. Outer dimensions of the assembled package are 44 in. long, 30⅝ in. wide, and 31½ in. deep —ready for filling.

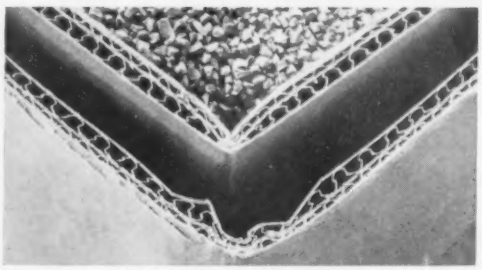
To start this packaging job, two Hall crew members position one of the customer's pallets on the loading dock. In assembling the package for filling, they use a Bostitch stapler to staple the bottom cap. Next, they position the inner and outer sleeves. To fill the package, they merely open and dump in the ground walnut shells from 18 50-lb. multiwall bags. Although the package is designed to hold 1,000 lb. of shells, they put in only 900 lb. This leaves headspace at the top which aids handling and use at the customer's plant.

After this they staple the top cap, normally using six ⅝-in. staples to each corner, or 48 in all for the top and bottom caps. After positioning the top cap, they steel strap the entire package to the pallet and the unit is ready for shipment. *(End)*

(See photographs next page)

1 WITH BOTTOM CAP and inner sleeve in place on pallet from customer using this package, two crew members put outer sleeve in place. It fits over outside of bottom cap. Board is 600-lb. test, double-wall corrugated, A- and B-flutes.

2 TO FILL PACKAGE with 900 lb. of ground walnut shells, crew men dump in contents of 18 50-lb. multiwall bags. Other customers receive shells in bags, but Hall set up corrugated package to meet needs of large user's in-plant system.



3 AIR SPACE BETWEEN inner and outer sleeves (not as great as photo suggests) is just enough to allow easy sliding of sleeves. Inner liner has A-flute next to product, B-flute to outside. Outer liner has A-flute inside, B-flute outside.

4 STAPLES SECURE END FLAPS of top and bottom caps. Crew puts 6 staples (3/8-in. size) per corner, totaling 48 for both caps. This is only packaging done at Hall's distribution warehouse; other customers use bags previously filled.

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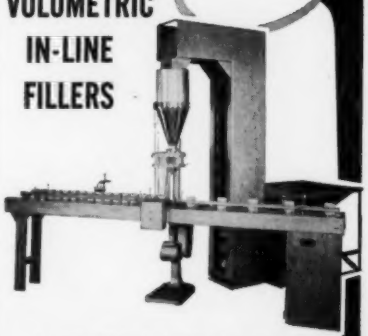

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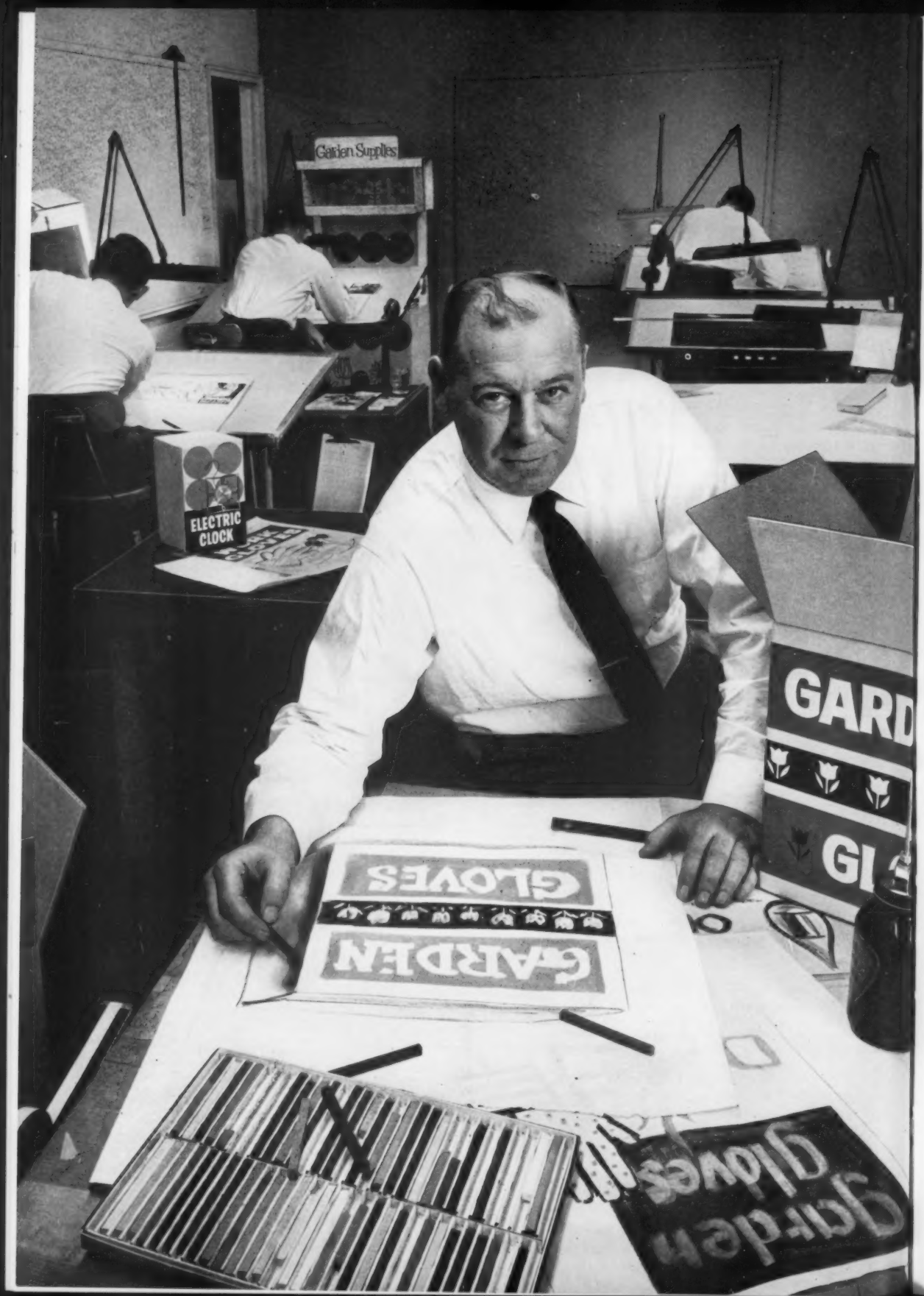
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How to put a show on the road

Charles "Chuck" Newman is an old hand at packaging showmanship. And an extraordinarily versatile one, too. As Union-Camp's Art Director for 26 years he's helped develop successful package designs for a wide variety of products.

"Chuck" and his talented team operate on the premise that every shipping container should be a traveling salesman for the products it carries as well as for the company that ships them. And there's certainly no lack of prospects. The average corrugated box, in its travels, meets hundreds of people and makes thousands of impressions. Yet its valuable billboard space often is neglected.

Distinctively designed boxes, as "Chuck" has demonstrated over and over, can work in dozens of ways. To merchandise a brand name—help create an image or personality for the product. Or, to tie-in with special or seasonal promotions. To dovetail with other advertising. To develop dealer preference by simplifying and speeding identification in inventory control. And through the combination of structural and visual design, to serve as eye-catching, easy-to-assemble display pieces—right at the point of sale.

But remember, designing art and print copy for corrugated boxes is a job for experts. It's an exacting medium to work with. How well your design succeeds depends, to a great extent, upon how well the artist knows the intricacies of the process and how to get the most out of it. "Chuck" Newman has a lifetime of experience in getting "the most" out of paper packaging and his staff is trained to his own high standards.

Your Union-Camp corrugated box representative is your passkey to more effective use of printed corrugated boxes. He'll be happy to show how they can be of value to you. A note on your letterhead will bring him to your office.

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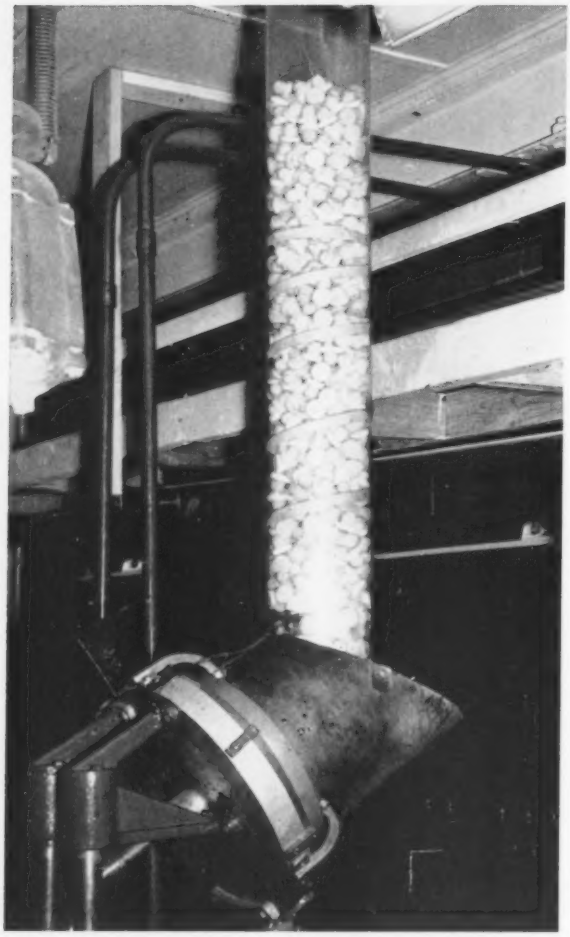

Rigid plastic tube connects supply room bulk hopper to hoppers on corking machines, eliminates presence of boxes of supplies on bottling room floor, gives assurance that the machine hoppers will not run out of corks.

Large tubes supply corks continuously

By Charles R. DeSpain,
Vice President and General Manager, Heaven Hill Distilleries, Inc., Bardstown, Kentucky

Eliminating ready supplies of packaging materials from the bottling room floor gives much needed space. We apply this practice to all supplies wherever possible. One instance is with our corks which are fed to the closing equipment from overhead.

We use both screw caps and corks as closures for our whiskey bottles. In the past, we have had boxes of both lying around the closing machines. Not only were they hazardous and inconvenient from the standpoint of "being in the way," but they took up much needed floor space.

Maintains Steady Flow Of Corks

To eliminate the necessity for boxes of corks in our bottling room, we installed a 6-in.-diameter Lucite tube connecting each corking machine hopper to a large bulk hopper on the second floor. Filled from the supply room, the bulk hopper maintains a steady, gravitational flow of corks to the corkers. Another advantage of this system is the fact that our corking machines never run out of corks.

The set-up was possible because the corks are the same in all respects. Cellulose seals are used over the corks and carry any distinguishing colors and/or printed matter for the many different private-label brands we bottle. Thus, **this principle can be applied to any closing operation where identical closures are used in large volumes from day to day.**

We would like to have a similar bulk-supply arrangement for the screw caps, but this would be complicated. Although all of the aluminum pilfer-proof caps are the same size, unlike the corks, they differ in color, printing, and so on, depending upon the brand of product. Since we make as many as six brand changeovers per day, it would not be practical to equip these cappers with a means of supplying the caps from the second floor as we would be cleaning out the hopper frequently. *(End)*

Charles R. DeSpain received a B.S. degree in chemical engineering from Speed Scientific School of the University of Louisville. Before joining Heaven Hill Distilleries in 1945, he was associated with other independent distilleries in a technical and managerial capacity. Mr. DeSpain is a member of the American Institute of Chemical Engineers and is a licensed professional engineer in the State of Kentucky.

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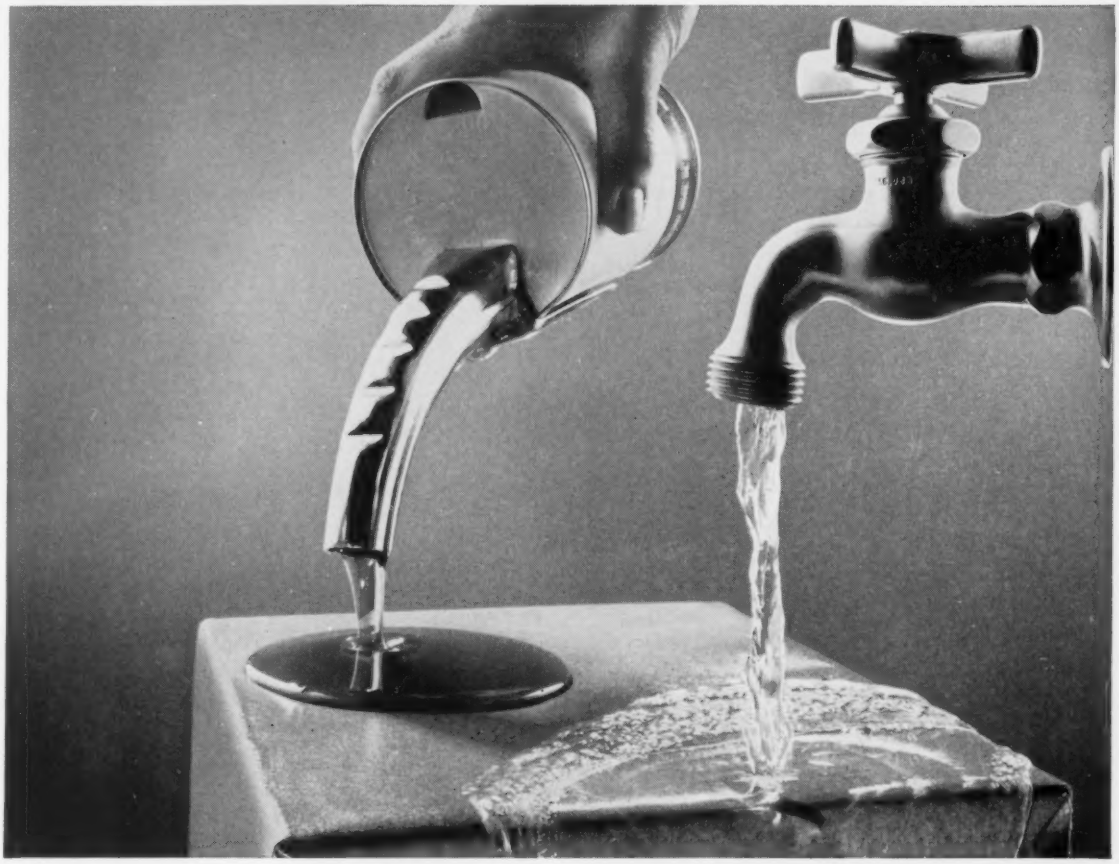

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In what way can SCOTCHGARD Paper Size and KEL-F Plastic Film help you package best? Write today to 3M Chemical Division for facts. Address inquiries to 3M Chemical Division, Department KCA-70, St. Paul 6, Minnesota.

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Thursday, July 21—1:00 P.M. to 6:00 P.M.

Western packaging show to be held in Los Angeles

The 1960 Western Packaging and Materials Handling Exposition will be held July 19-21 in the Pan Pacific Auditorium in Los Angeles. It will cover a display area larger than any of the past shows.

Over 160 exhibitors will display their products. Advance inquiries show that the attendance may reach 11,000, made up of owners and operators of businesses using packaging and materials handling equipment, materials, machinery and its various components; plant managers, production and distribution engineers and executives, and purchasing agents—all concerned with packaging a variety of products.

Many exhibitors report the first Western display of new machinery. In some cases, they report that improved equipment and packaging supplies will be shown for the first time.

There is no registration fee for the exposition. Those planning to attend are urged to obtain rapid registration cards which are designed to save time and avoid delay upon arrival at the exposition. These tickets are available, without cost, from any of the exhibitors and from Clapp & Poliak, producers of the show.

For hotel reservations, contact the hotel of your choice or write directly to: Los Angeles Convention and Visitors Bureau, 404 South Bixel Street, Los Angeles 54, California. Mention the Western Packaging Exposition.

For advance registration tickets or additional information, contact: Clapp & Poliak, Inc., 759 Monadnock Building, San Francisco 5, California. (Telephone DOuglas 2-7826).

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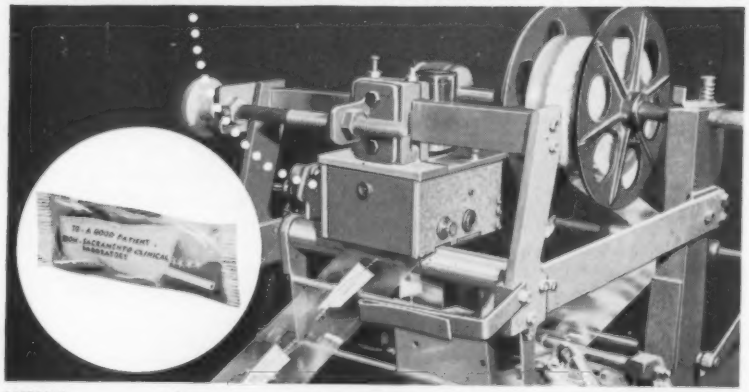

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SECURITY GUARD...that's the particular job this Sefton Fibre Can is doing. Protecting brand-name merchandise against counterfeiting. In this case, it's a famous auto part which cannot be replaced by a shoddy substitute. When any product comes in this string-opening package with the seal unbroken, the buyer knows he's getting the genuine article. To **pack it—move it—sell it** is the business of CCA packaging.

CONTAINER CORPORATION OF AMERICA

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CCA

Folding Cartons, Shipping Containers, Sefton Fibre Cans, Molded Plastic Products, Point-of-Purchase Displays, Paperboard

ANNOUNCEMENTS OF MACHINERY AND PRODUCTS

1. Before each announcement headline is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard inside the back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card—we pay the postage.

For your convenience, we have also included addresses of suppliers so that you may write directly for more information.

1. Latex Form of Resin Barrier Coating Material

The development of a water-system, latex form of polyvinylidene chloride resin, presently identified as Resyn 3600, has been announced. Used as a coating material, it may be applied to a variety of porous and non-porous substrates by standard coating equipment. The new resin form is said to retain the protective properties of polyvinylidene chloride film in the final coated surface. Properties of this material include resistance to transmission of water vapor and common gases such as oxygen, nitrogen, and carbon dioxide—significant factors in food packaging. Materials coated with the resin have a high degree of water resistance, chemical inertness, and non-flammability, the manufacturer states. Paper and paperboard packages coated with this resin could be used for the packaging of such items as multiwall sacks, labels, masking paper, release paper, hospital bags, seed packets, cigarette packs, building papers, soap boxes and wraps, fibre drums, boxes for cereals, etc. Solid particles contained in this material are of the 0.05-micron size. It is a flexible polymer system, supplied at 50-per cent solids. For further information, write: National Starch and Chemical Corp., Dept. PE, 750 Third Ave., New York 17, N.Y., or *circle number.*

2. Rayon Cord Strapping

A new product made of rayon cord and called Avistrap cord strapping has been introduced. For use in industrial packaging, the material is supplied in coils which weigh approximately 21 lb. and it has a disposable spool. It is available in single-coil or 4-coil cartons and it may be imprinted with the company or product name of the user. Less storage space, in comparison with other strapping materials, is a feature of this new product; e. g., a 1,000-yd. spool of heavy-duty Avistrap measures 13½x6 in. and weighs considerably less than other materials for strapping, according to the manufacturer. For further information, write: American Viscose Corp., Dept. PE, 1617 Pennsylvania Blvd., Philadelphia 3, Pa., or *circle number.*

3. Can Seam Tester

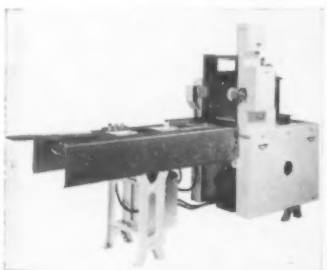
Using this new universal can seam tester, an experienced operator can open and inspect up to 6 cans/min., the maker says. The self-contained unit cuts lids with a precision rotary saw for easy removal, cross cuts seams for checking seam engagement, and strips can cover hook from body hook for measuring and for accurate inspection of sealing performance. The unit is 28x25x13 in. For further information, write: Hi-Speed Checkweigher Co., Inc., Dept. PE, 605 W. State St., Ithaca, N.Y., or *circle number.*

4. Snap-Top Vial

Snapping off a plastic tip makes Kimble's new Optiseal serum vial ready for use. The one-piece plastic closure "locks" onto a glass vial to provide tamperproof packaging. It allows easy opening by means of snapping off a protruding plastic knob or tip and it may be fitted with either rubber plugs or discs through which a hypodermic needle may be inserted. The glass vial and plastic closure come in 9 sizes ranging from 1 to 25 ml. For further information, write: Owens-Illinois, Kimble Glass Co., Dept. PE, Toledo 1, Ohio, or *circle number.*

5. Tray Covering Unit

To apply roll-fed foil to "TV" dinner trays at speeds from 40-80 trays/min., a heavy-duty "three-quarter automatic" machine has been developed. Called the Tray Topper, it automatically feeds foil continuously from a roll, registers the printed design, cuts the sheet to size, positions it on top of the tray, and folds under the crimps on three sides. The fourth fold-under is made by the operators who remove the trays from the machine. A standard attachment on the unit features a "no tray—no foil feed" and permits interrupted feeding of trays without the need for slowing or stopping the machine. Electric eye registration is also standard equipment. For further information, write: Scandia Packaging Machinery Co., Dept. PE, North Arlington, N.J., or *circle number.*



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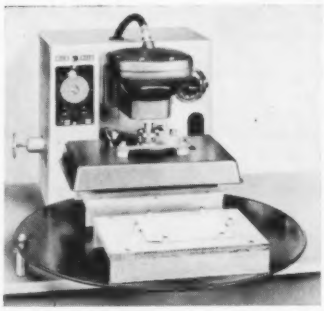
6. Manual Blister Machine

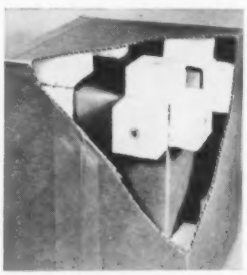
Clear-Pak Manual, Model 04CP, is a newly-developed, manually-operated plastic blister sealing machine



which was designed for use in the blister packaging of short run items and sample making. Small products may be packaged in one operation by a single operator who can turn out 10 completed packages/min., according to the maker. The machine allows one package to be sealed while the next is being loaded through the use of a rotating table. The unit accommodates blisters of approximately 6x8 in. with heights from a fraction to 3 in. and it may be modified to seal products up to 10 in. or more in height. It occupies a bench area of 18x25 in. For further information, write: Erdco Engineering Corp., Dept. PE, Addison, Ill., or *circle number.*

7. Package Cushioning

A new product called Hardi-Pads, is said to create a floating inner package to hold a product firmly on all



eight sides of a shipping container. The product consists of foam laminated to corrugated which fits into each corner of an outside shipping carton and supports an inner container holding the product. Four more shock-absorbing corner pads are then placed around the top of the inner package before sealing the outer container. A special feature of this cushioning material is the reinforcement of the foam to eliminate settling, the producer says. It is available in a number of standard thicknesses to handle packages ranging in weight from 8 to 150 lb. For further information, write: Hardigg

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saves money

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silicone release agent

"wherever sticking is a problem"

SLIPICONE® goes on in a breeze . . . makes any surface slick . . . keeps adhesives, packaging materials and foods from sticking or piling up where you don't want them . . . keeps equipment cleaner, more sanitary . . . assures neat, attractive packages and labels.

SLIPICONE is nontoxic . . . safe to use in contact with all foods. Stays effective over a broad temperature range . . . from 40 below to 400 above zero!

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SLIPICONE comes in four handy sizes: 12 oz. aerosol can; 2 and 8 oz. tubes; 10 lb. can . . . all economical to use.

Get SLIPICONE from your paper merchant, packaging materials supplier, or write Dept. 6407 for name of nearest distributor.

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Industries, Dept. PE, South Hadley Falls, Mass., or *circle number.*

8. Hermetic Packaging

An aluminum foil package which is air and moisture tight is now available. The hermetic seal is accomplished by coating the container and cover with a protective heat-sealable plastic. The packages feature a pull-tab cover. To seal, the coated container and cover are brought into contact by applying heat to both surfaces. The plastic coating materials fuse between the two surfaces and after cooling, the plastic returns to its original state, thus effecting a hermetic seal. Three stock container sizes are available in capacities of 5, 8, and 10 fl. oz. All containers have a topout diameter of 5-3/16 in. and feature full curl rim construction. Flat covers are available for the containers. For further information, write: Ekco-Alcoa Containers Inc., Dept. PE, Wheeling, Ill., or *circle number.*

9. Transparent Lid Unit

Container lids of either acetate or polystyrene are produced on this new desk-size transparent lid ma-

chine which accommodates sheets of material from 0.005 to 0.010 in. thick. Up to 30 lids/min. can be produced in sizes from 3x2x½ in. to 14x9x2½ in. or 13x8x3 in., the manufacturer says, with the machine operating at 1600 pieces/hr. Lids are creased and heat sealed without prior scoring or bending. The edge is beaded to give rigidity to the lid. A two-station system forms and seals. The company says that the unit's mechanical-electrical heater design eliminates the need for electronics and solvents. For further information, write: FMC Packaging Machinery Division, Dept. PE, 4994, Summerdale Ave., Philadelphia 24, Pa., or *circle number.*

10. Hot-Melt Adhesives

Two new formulations of a cord-like hot-melt adhesive have been introduced. Thermogrip 308 adhesive is for bonding double polyethylene-coated boards, including paper milk cartons and folding boxes. Thermogrip 309, available in ¼- and 3/16-in. diameters, has been developed for foil sealing operations for users of larger volume applicators. A smaller size, Thermogrip 409 adhesive, is for smaller capacity applying systems installed on various types of in-plant carton-closing equipment. The adhesive is packed on reels ready for use. For further information, write: United Shoe Machinery Corp., Dept. PE, 140 Federal St., Boston, Mass., or *circle number.*

11. Vial And Closure

A new version of a snap-cap closure to fit tooled-neck glass finish containers has been announced. The

combination provides a prime internal seal with the outer portion of the cap providing a supplemental seal and lock, the manufacturer says. Suggested for use in packaging hygroscopic dry materials, the container lends itself to automatic capping. The vials are offered in sizes of 1, 2, 3, and 4 dr. For further information, write: Brockway Glass Co., Inc., Dept. PE, Brockway, Pa., or *circle number.*

12. Skin Packaging Machine

The new Model F automatic skin packaging machine is designed to skin-pack as many as 20 product cards (size 4x6 in.) in 15 sec., according to the maker. The unit will accommodate cards to size 22x34 in. It features an Equi-thermo heater and will handle products requiring up to 5-in. drape. The company indicates that the changeover time has been reduced to 15 to 20 min. from one product to another and production speeds allow for the handling of two master sheets (22x34 in.) a minute. The machine may be equipped with male and female molds for production of rigid and semi-rigid blister or bubble packs. For further information, write: Print-A-Tube Co., Skin-Pak Machinery Div., Dept. PE, Paterson, N.J., or *circle number.*

13. Cellophane

A new type of cellophane, designated New MSD-60, has been engineered to provide heat seals at temperatures at least 50°F. lower than have been possible with other cellophanes, the maker says, yet the film retains the good appearance, protection, and non-blocking properties that were characteristic of the former MSD-60. The new type requires only 250°F. to provide a seal and has a yield of 21,000 sq. in./lb. For further information, write: E. I. du Pont de Nemours & Co. (Inc.), Film Dept., Dept. PE, Wilmington 98, Del., or *circle number.*

14. Blow Molding Machine

A new unit (450 Series) has been designed for molding containers, liners, and drums to 30-gal. capacities. A machine with 4 molding stations can mold items to 14x48 in. at dry cycle rates up to 6,000 parts/hr. The 2-station models mold pieces to 14x28x48 in. The new machines will handle 450 lb. of material an hour from continuously running 4½-in. extruders. Automatic molding operation and automatic part ejection permit use of conveyor installations for moving molded items to accessory machines for filling, finishing, or packing. The manifold of the new series is built to handle the large parisons used in blow molding large items. The equipment utilizes the company's Auto-Blow two-stage cycle, with only linear motion. Parts are cooled continuously, except for the split-second required for mold closure. For further information, write: Auto-Blow Corp., Dept. PE, 401 Bishop Ave., Bridgeport 10, Conn., or *circle number.*

15. Aluminum Aerosol Can

These seamless, aluminum aerosol containers have been developed for industrial use. The 16-oz. cans are

said to be capable of withstanding internal pressures of 480 lb./sq. in. The container is made without seaming or welding to provide a high-pressure package of one-piece construction. The container was designed for use in such fields as the distribution of refrigerant gas, fire extinguishers, insecticides, and as an industrial-type aerosol. For further information, write: Aluminum Co. of America, Dept. PE, Pittsburgh 19, Pa., or *circle number.*

16. Pressure-Sensitive Paper

Now available are two new types of pressure-sensitive protective papers —KB1, which is non-stretchable; and KB2, a resilient, stretchable covering that has a latex adhesive. The paper is supplied in a standard roll measuring 36x48 in. The paper is smoothly applied without wrinkling or bubbling and, if necessary, may

use this page to develop an idea in 60 seconds

The Polaroid Land camera has had phenomenal sales success. It is expertly designed . . . the materials and workmanship are the best. Now, even the package is something special. The camera and accessories are cushioned in a seat of DYLITE® expandable polystyrene.

DYLITE's unique combination of properties—lightweight, shock resistance and easy moldability to any contour—make it the ideal choice for the variety of platforms and inserts used in Polaroid packages.

Additional properties of strength, water resistance and insulation have made DYLITE a leading choice of package designers in a wide variety of industries. Chances are it can make an excellent improvement in *your* package.

(60 seconds are up. Did you get an idea? Write to Koppers Company, Inc., Plastics Division, Pittsburgh 19, Pennsylvania.)

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DYLENE® *polystyrene,* SUPER DYLAN® *polyethylene and* DYLAN® *polyethylene are other fine plastics produced by Koppers Company, Inc.*

be temporarily removed and replaced without any harm to its protective qualities, which are effective for 6 months, according to the producer. The present material is white, may be written upon, and is obtainable in various sizes. For further information, write: Tech-Industro Co., Dept. PE, 415 W. Pike St., Philadelphia 40, Pa., or *circle number.*

17. Stapling Head

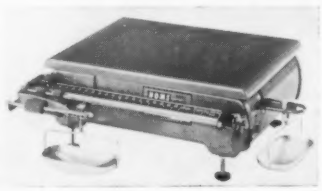
Model D1400S is a self-contained, air-driven stapling head especially designed for mounting directly on a conveyor, bench, or packing table. Utilizing wide-crown staples, it seals the filled containers entirely from the outside and is easily adjusted to accommodate different box sizes and corrugated board thicknesses without the use of tools. The stapling head may be rotated to apply staples vertically or horizontally. A standard model is equipped with an automatic touch-trip and the unit is also available with a foot-trip control. For further information, write: Bostitch, Inc., Dept. PE, 866 Briggs Dr., East Greenwich, R.I., or *circle number.*

18. Vial With Safety Lock

For the packaging of medications that contain barbiturates, narcotics, tranquilizers, nitro-glycerin, or similar dangerous drugs, the Clearsite safety vial is being produced. These clear plastic vials are equipped with a bright red closure with a built-in locking device. In order to remove the closure, it is necessary to push it down and then turn. Available in either 7- or 10-dr. capacities, the vials have been treated to accept a label easily. For further information, write: Celluplastic Corp., Dept. PE, 24 Commerce St., Newark, N.J., or *circle number.*

19. Counting Scale

This new double-ratio counting scale was designed for use in production and packaging departments. Available in two models, the 51CR and 105CR, they react to 1/10 oz. placed on the weighing platform. Two counting pans are supplied with ratios of 1:9 and 1:99. A compensating device enables the user to offset the weight of any container, up to 5 lb., used for holding parts to be counted. Model 51CR features a counting and regular weighing capacity of 51 lb. graduated by ¼ oz.; the 105CR, 105 lb. by 1-oz. graduations. For further information, write: Douglas Homs Co., Dept. PE, 1314 Rollins Rd., Burlingame, Cal., or *circle number.*



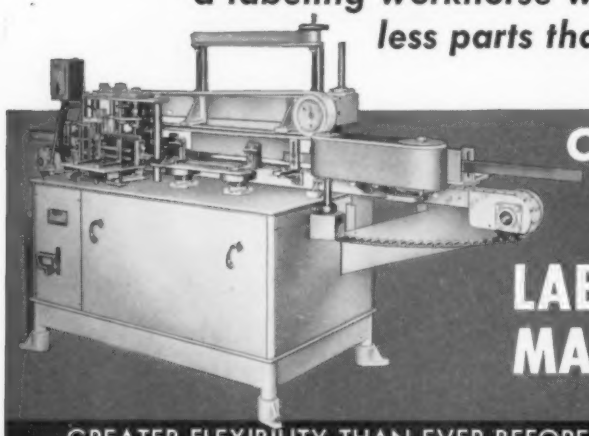
20. Vibration Tester

This 400-lb. capacity transportation vibration simulator machine, designated the 400-SVMC-3.5, employs an enclosed, compact design and produces synchronous circular motion in a vertical plane. The machine operates at a fixed displacement of 1 in. in the speed range of 150-300 r.p.m. When the machine is operated at approximately 270 r.p.m., a table acceleration of slightly more than 1 G is produced causing the tested object on the table to separate from it on each cycle of operation resulting in a series of shocks of random intensity. Power is furnished by a ¾-h.p., 1750-r.p.m. motor and variable speed drive. For further information, write: L.A.B. Corp., Dept. PE, Skaneateles 5, N.Y., or *circle number.*

21. Nomenclature Paper

Print-Shield nomenclature paper is a new thermoplastic adhesive-coated product developed for military specification Level-A and Level-B packaging for placing nomenclature information on containers. Adhesive is applied by dropping precut sizes individually into a slot at

a labeling workhorse with less parts than any semi-automatic machine



CONTINUOUS MOTION
Fully Automatic
LABELING MACHINE

GREATER FLEXIBILITY THAN EVER BEFORE POSSIBLE

PRODUCTION variable speed drive from 40 to 150 per minute.

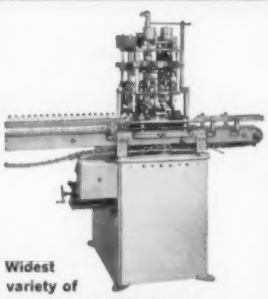
LABEL RANGE "postage stamps" to 6" wide by 7" long.

LABEL MATERIALS foil, paper, plastic, etc.

CHANGEOVER TIME approximately 15 minutes

CONTAINER RANGE 1½" high by 1" diameter through 14" high by 7" diameter. Practically any shape.

Want to know more? Send for literature and list of users.



Widest variety of
LIQUID FILLING MACHINES

Fully automatic Overhead drive in vacuum, gravity and volumetric types. Models from 8 to 40 spouts handling all types of foamy and still liquids — for glass, metal or plastic containers from fractional ounce to gallons. Also semi-automatics and custom-engineered models.

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191 Berry Street Brooklyn 11, N. Y.
Manufacturers of a complete line of fully automatic and semi-automatic liquid filling and labeling equipment.

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an 18-story impact...

cushioned in urethane foam

Unbelievable? Not to the growing list of packaging engineers who are specifying urethane foam to protect expensive instruments, lenses, precision parts and fine tools from in-transit jars and jolts which often exceed G-forces in excess of an 18-story fall.

Urethane foam is the same material auto and aircraft makers use for shock-absorbing safety padding. Contour cut, die cut or molded in place, it is the most efficient impact-absorbing material yet invented.

The "Kudl-Pak,®" a precision part storage box used in this demonstration, is typical of the many versatile packaging ideas possible with lightweight, flexible or semi-rigid urethane foams. Cost is low; applications infinite!

Write Mobay Chemical Company for full details about urethane foam and sources of supply.

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Mobay is the leading supplier of quality chemicals used in the manufacture of both polyether and polyester urethane foams.

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Stop costly overweights and save on packaging labor with the right model of Gump Packaging Equipment. Speedy, highly accurate Bar-Nun "Auto-Check" and Edtbauer-Duplex Weighers (illustrated) for manual lines. Automatic Bar-Nun Bag Packaging Equipment, and Can, Jar or Carton Lines save on packaging labor as well as product. Extremely dependable operation—accuracy guaranteed.

Choose equipment to suit the job. Write for recommendations, without obligation. Tell us the material, weight, container, and production requirements.

B. F. GUMP CO.
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CUT *SHIPPING MATERIAL AND LABOR* **COSTS**

NEW!
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Fastest gummed tape sealer! Feather-touch key feed! 5 operations in 1 second—electrically! Selects, measures, moistens with hot water, cuts and delivers any gummed tape with effortless speed of heavy industrial shipment-sealing equipment...at a fraction of the price. Ask for Proof-Demonstration without obligation.

Better Packages, Inc. 253 Canal St Shelton, Conn.

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the top of an activator-dispenser and in a few seconds they are ready for application. The paper can be printed, typed, or reproduced on various machines now in use. Information placed on the adhesive side of the paper becomes imbedded in the adhesive coating so that when the printed and cut-to-size paper is activated and secured to a surface, it is encased and protected with a film which is water resistant and unaffected by the elements, the producer says. For further information, write: Nashua Corp., Dept. PE, N.H., or *circle number*.

22. Reclosable Case

Fibre Zip is a new case which may be filled from the end, but may be opened easily from the top and then reclosed and safely stacked, even when only partially emptied, according to the manufacturer. It features a pull-tab and the glue flap tucks inside the case which remains rigid for stacking. The case is similar to a linerless ice cream carton and has a 2-in. outside glue flap which provides the tab to pull back the case top. For further information, write: Fibreboard Paper Products Corp., Dept. PE, 475 Brannan St., San Francisco 19, Cal., or *circle number*.

23. End-Open Caser

This end-open caser, FMC Model 10, has been designed for single-tier loading of large size cans (Nos. 12, 10, 46 oz., 307x710, and 307x700) into end-open shipping cases. Cans are handled in an upright position and are conveyed through the machine at a medium speed. It will handle 10 cases of Nos. 10 or 12 cans/min. and 7 to 9 cases/min. handling the 46-oz. cans and those of 307 diameter. The unit is automatic in its cycling and consists essentially of a feed draper, a loading chamber, a pusher plate, a mechanical support and lowering arm, and a loading funnel. For further information, write: FMC Canning Machinery Div., Dept. PE, P.O. Box 1120, San Jose 8, Cal., or *circle number*.

24. Vertical Compression Unit

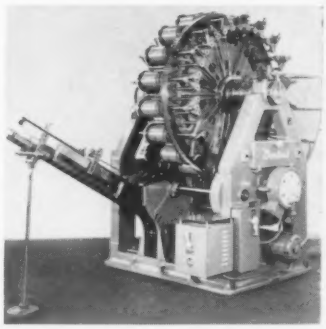
Standard-Knapp Type SK677 Verti-seal is a vertical compression unit designed to conserve floor space and to elevate cases to a higher level. The sealer is supplied in a minimum discharge elevation of 8 ft. and handles a maximum case size of 20½x 14½x15 in. Minimum case size is 10x 5½x5 in. For further information, write: Emhart Mfg. Co., Portland Div., Dept. PE, Portland, Conn., or *circle number*.

25. Food Packaging Film

Two new self-service food films have been developed: Vitafilm F-10 cheese wrap and non-fogging Vitafilm PW for produce packaging. The F-10 is a 50-gauge material which yields 43,000 sq. in./lb. and is available in roll widths of 8, 10, or 12 in. on 3-in. cores, with a 5½-in. outside diameter for use in existing cutters and dispensers. The film is flexible and heat seals over a range of temperatures. Vitafilm PW (75-gauge) possesses similar characteristics and yields 28,600 sq. in./lb. It is available on rolls wound on a 6-in. core with a 9-in. outside diameter in any packaging width required. For further information, write: The Goodyear Tire & Rubber Co., Packaging Films, Dept. PE, Akron 16, Ohio, or *circle number*.

26. Case Tester

This automatic machine is specially designed to leak-test large sizes of tin cans of various shapes at speeds

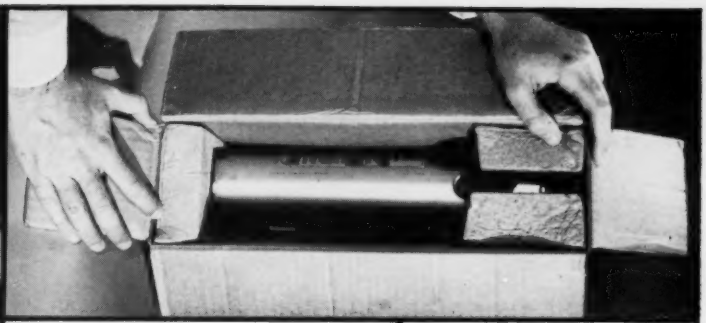


up to 210 cans/min. Known as the Borden's 18-pocket mechanical type can tester, it is capable of handling round, square, oblong, and other shape cans up to No. 10 size. The unit is styled to handle 404- to 610-diameter cans measuring 300 to 908 in length. Its standard speed range is 100-200 cans/min. Improvements over earlier models include test pockets for quicker changeover, increased test cycle period for leak detection, and a sensitive switch which eliminates the problems of atmospheric interference. For further information, write: Borden Co., Can Machinery Div., Dept. PE, 350 Madison Ave., New York 17, N.Y., or *circle number*.

27. Aluminum Containers

Four new aluminum containers have been introduced for packaging foods. They include: an oblong, 3-compartment tray with a T-shaped lower divider and a full-curl rim, is 15/16-in. deep, and holds 21.5 cu. in. or 12 fl. oz.; a squared-end casserole (2-7/16 in. deep) which holds 93.5 cu. in. or 52 fl. oz.; the deep-round pizza pan which has a vertical depth of 1⅛ in., holds 60.6 cu. in. or 33.6 fl. oz., and has a hemmed edge; and the ribbed-bottom broiler tray with cross depressions in the ribs, holds 93.6 cu. in. or 52 fl. oz., and has a

Radio manufacturers report package savings up to 9 cents per unit on table models, and labor savings up to 3 cents per unit, after switching to Tekmold.



Three custom-molded Tekmold caps reduce costly interior assembly in packaging this fire extinguisher. Only four movements are needed to put the unit in the outer container.

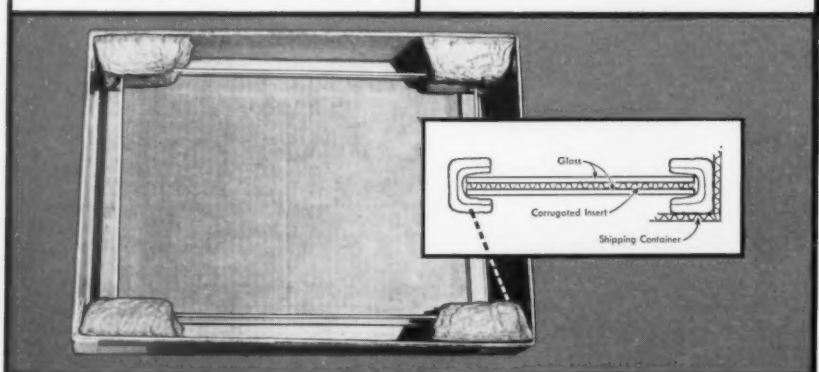
The more valuable or vulnerable the product, the more necessary to give it Tekmold protection. This projector travels safely because of Tekmold.

what a variety of shapes and sizes . . .

yet they all pack safely and economically in

TEKMOLD®

protective packaging



Positive protection is given to fragile or sensitive products like this *p*H electrode. The rigid, form-fitting, molded Tekmold packaging "suspends" the contents... cushions against shock from any direction.

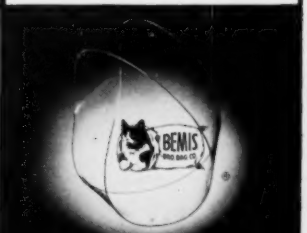
This photo and diagram shows how flat sheets, such as glass, may be safely and economically "floated." Tekmold packaging is tailored to your job... ready to use.

Bemis Tekmold, the custom-molded protective packaging, costs you less than conventional methods because it replaces multiple-piece, die-cut and scored corrugated assemblies . . . and also minimizes packing labor —there's no slow hand-folding and assembling.

Tekmold is *adaptable*. It may be the real answer to your problem. For the *complete* Tekmold story, write, wire or phone us today.

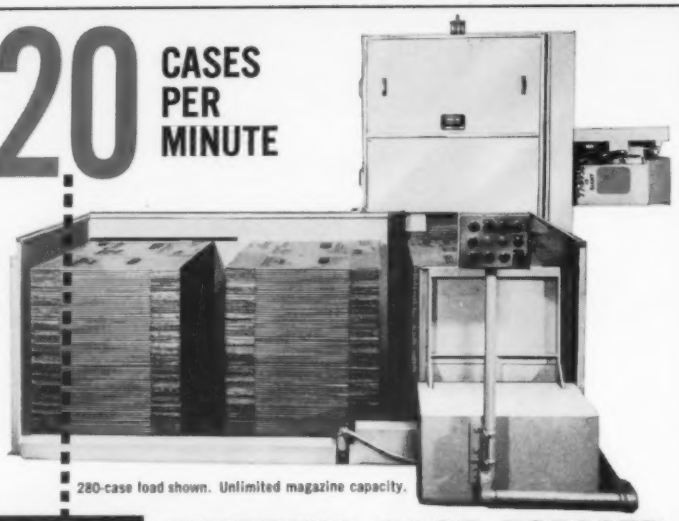
TEKMOLD PRODUCTS PLANT

325 27TH AVENUE N. E. • MINNEAPOLIS 18, MINNESOTA



WHERE FLEXIBLE PACKAGING IDEAS ARE BORN

20 CASES PER MINUTE



280-case load shown. Unlimited magazine capacity.

CARAL SHIPPING CASE FORMER

No operator needed! Fully automatic CARAL unit forms cases at speeds to 20 per minute. Smooth, jam-free operation adjusts to standard and special case sizes; adapts to all standard case packers with a minimum of modification. Easy, floor level loading. Cases formed from top of stack. Units now operating save owners dollars and down time. The *CARAL Case Former* will do the same for *you!*

Write today!
Details sent immediately!

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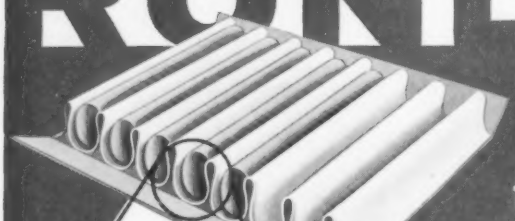
RONDO®

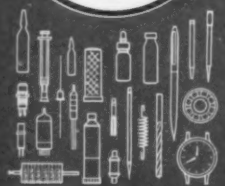


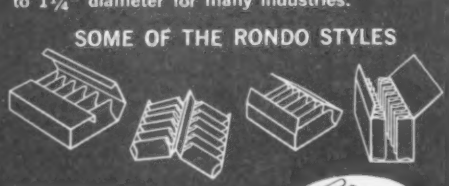
"the pack with the built-in shock absorber"

Holds and protects inserted items by the spring-clip action of its fluted partitions. The restricted opening ① and the spaces between ② and beneath ③ are the basic elements of this unique package.

Applications for various articles from 5/16" to 1¼" diameter for many industries.

SOME OF THE RONDO STYLES





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raised vertical curl for strength. For further information, write: Kaiser Aluminum & Chemical Sales, Inc., Foil and Container Div., Dept. PE, 300 Lakeside Dr., Oakland 12, Cal., or *circle number.*

28. Inspection, Loading Machine

An automatic machine that inspects milk cartons, arranges them into case loads, and places them into the cases has been designed. Cartons can be handled at speeds up to 150 cartons/min. and wooden, fibre, or wire cases may be used. The unit checks for torn heat seal, lack of staple in the top of the carton, crushed panel along the gusset and orientation of the carton for scoreline, improperly folded gusset, feeding the case loader, the developer says. The unit features inspection of dimensions to 1/16-in. tolerance, weight checking to ½-oz. tolerance, separate rejection stations, and interlocks that insure properly positioned and completely filled cases. For further information, write: Thiele Packaging Machinery Co., Dept. PE, 1000 Berry Ave., St. Paul 14, Minn., or *circle number.*

29. Polystyrene Containers

The development of containers which are made of expanded polystyrene and are molded into a variety of shapes and colors has been announced. A semi-automatic process makes possible volume production of these containers. Wall thicknesses and density of the plastic may be varied to provide the proper strength-to-weight ratio for specific applications, the designer says. The containers have a smooth, polished finish and may be stacked. For further information, write: Sheffield Plastics, Inc., Container Div., Dept. PE, Sheffield, Mass., or *circle number.*

30. Semi-Automatic Packager

This new GLM 3000 El Rancho machine has been developed for semi-automatic packaging of stack-packed, thick-sliced bacon, frankfurters, sausage, and other meat items. A package, designed for use on this machine, has a web construction with full end panels to which adhesive is pre-applied in manufacturing. On the packer's production line, the product is placed on a U-board, tray, or backing board and this unit is then slipped into the end of the carton. The web corners of the package are then tucked in and the end panels brought into place, either by hand operation or on a specially developed jig. The package is next fed into the GLM 3000 machine where the adhesive is activated by heat units and set by cooling units to seal the package. For further information, write: Marathon, Dept. PE, Menasha, Wis., or *circle number.* (*End*)

INDUSTRY LITERATURE AVAILABLE FREE

1. Before each item heading is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard inside back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card—we pay the postage.

For your convenience, we have also included addresses of suppliers so that you may write directly for more information.

101—Weight Imprinter

Descriptive material is being offered on the Weight Brander, a completely automatic means of weighing cartons or containers and stamping the weight directly thereon. The 2-page brochure illustrates the versatile applications of this unit and points out that it will imprint the weight on any side of the container at high production speeds. For further information write: Wilson Automation Co., Dept. PE, P.O. Box 3855, Detroit 5, Mich., or **circle number.**

102—Slotted Angle Frames

An illustrated folder describes economies which have been effected through use of slotted angle frames in shipping machinery, communications equipment, and fabricated metal goods. For further information, write: Acme Steel Co., Dept. PE, 135th St. & Perry Ave., Chicago 27, Ill., or **circle number.**

103—Shock Recorder

A new brochure provides details on shock-recording instruments and includes descriptions of several new types which were designed to fulfill the needs of special, but widespread, shock measurement problems. For further information, write: Impact-O-Graph Corp., Dept. PE, 1900 Euclid Ave., Cleveland 15, Ohio or **circle number.**

104—Corrugated Shippers

A series of data sheets describes problems, solutions, and results in shipping a variety of products. It tells of case studies which showed ways in which packaging engineers cut costs while providing adequate protection through improved container design. For further information, write: The Mead Corp., Mead Containers Div., Dept. PE, Cincinnati 12, Ohio, or **circle number.**

105—Weigher/Bagger

A new Rollaweigh produce bagger for fast, accurate weighing and bagging of many produce items in quantities up to 25 lb. is discussed in Bulletin 3381. It gives complete specifications, illustrations, and descriptions of the special features on the produce bagger. For further information, write: Exact Weight Scale Co., Dept. PE, 541 E. Town St., Columbus 15, Ohio, or **circle number.**

106—Reinforced Sealing Tape

Newly published literature deals with the subject "2-strip sealing is lower in total cost—yet superior—than stitching and/or stapling." Test results, cost factors, and quality factors are considered in this brochure. For further information, write: Mid-States Gummed Paper Div., Minnesota Mining & Mfg. Co., Dept. PE, 6850 South Harlem Ave., Bedford Park, Ill., or **circle number.**

107—Bag Palletizer

An illustrated bulletin provides information on the operation of an automatic bag palletizer. Requiring no operator, the unit was specifically engineered to cut production costs in two- and three-shift plants which package products in multiwall bags. It automatically loads bags of any size on wood, metal, or paper pallets. For further information, write: Miller Engineering Corp., Dept. PE, 119 E. Barbee, Louisville, Ky., or **circle number.**

108—Wrapping Machines

Machines which wrap, seal, label, and imprint automatically are described in an illustrated folder. For further information, write: Oliver Machinery Co., Dept. PE, Grand Rapids 2, Mich., or **circle number.**

109—Ball Fitment Applicator

Details about a new automatic, high-speed machine designed to apply the fitment and rolling ball in popular roll-on product containers are the subject of a new catalog sheet. It includes an illustration and specifications on the Model DBA which feeds both the receptacle fitment and the plastic ball automatically in a tandem chute arrangement. For further information, write: Resina Automatic Machinery Co., Inc., Dept. PE, 572 Smith St., Brooklyn 31 N.Y., or **circle number.**

110—Coated Kraft Papers

Samples of polyethylene coated kraft papers are presented in a file portfolio kit which also contains the story on these protective grades. Those included are coated, laminated, creped, special treated, pouch papers, foil combinations, and trade-marked grades using clear, opaque, or colored polyethylene. For further information, write: Thilmany Pulp & Paper Co., Dept. PE, Kaukauna, Wis., or **circle number.**

111—Powdered Polyethylene

"Microthene—Polyethylene in Powder Form," is a new 8-page booklet which explains how this new development in plastics may be used. It presents fields of application, such as metal, textile, glass, and paper coating, as well as the molding of very large polyethylene items. For further information, write: Technical Literature Dept., U. S. Industrial Chemicals Co., Dept. PE, 99 Park Avenue, New York 16, N. Y., or **circle number.**

112—Film Cost Computor

A computor for figuring approximate costs and yields for polyethylene and cellophane is being offered. It operates on the "slide rule" principle. Typical problems and solutions are given as examples. For further information, write: Olin Mathieson Packaging Div., Dept. PE, 655 Madison Ave., New York 21, N. Y., or **circle number.**

113—Portable Case Stapler

A folder is available which deals with a portable, compressed air operated Air Boxes. The machine weighs 6½ lb. and staples tops of filled shipping containers. For further information, write: International Staple & Machine, Dept. PE, 810 Herrin Ave., Herrin, Ill., or **circle number.**

114—Panel Stock

Ply-Veneer, a lightweight, low-cost panel stock of kraft overlaid, distended fir veneer is described in a folder which suggests varied industrial uses, with emphasis on industrial packaging. The material is available in widths up to 8 ft. and unlimited lengths. For further information, write: Silvatek Div., Weyerhaeuser Co., Dept. PE, Tacoma 1, Wash., or **circle number.**

115—Polystyrene Materials

A six-page bulletin describes properties and applications of the six general categories of Styron, a series of polystyrene materials. The bulletin discusses toughness, rigidity, moldability, luster, clarity, etc. For further information, write: Dow Chemical Co., Plastics Dept., Dept. PE, Midland, Mich., or **circle number.**

116—Plastic Tubes

Now available is a technical service bulletin on polyvinyl chloride and linear polyethylene tubes. It gives information on the advantages of these tubes, services offered by the company, colors, caps and fitments, printing, coatings, and shipping. A specification sheet on the various tubes is included. For further information, write: Thatcher Glass Mfg. Co., Inc., Plastic Container Div., Dept. PE, P.O. Box 363, Nashua, N. H., or **circle number.**

117—Polyester Film Data

Brochure P-KSPFR (191) Jr. is a technical data sheet on Scotchpak brand heat-sealable polyester films. A wide variety of end uses are illustrated, including a new barrier material utilizing a base of scrim and metalized Scotchpak. One page of the brochure is devoted to a comprehensive properties and characteristics chart. For further information, write: Minnesota Mining & Mfg. Co., Film Products Group, Dept. PE, 900 Bush Ave., St. Paul 6, Minn., or **circle number.**

(Turn Page)

end sticking

reduce down time

with **TEMP-R-TAPE®**

Temp-R-Tape eliminates sticking problems and undesirable accumulations. No materials, even those of a sticky, or viscous nature will adhere fast to its slick, wax-like TEFLON surface. Pressure-sensitive . . . it's easy to apply . . . easy to remove . . . reduces the down time involved in sprayed or baked-on Teflon surfacing. Temp-R-Tape has a useful temperature range of −100°F to 500°F. It's odorless, non-contaminating, non-absorbing and durable.

NON-STICK USES: heat sealing bars; forming plates, dies and bars; labelling rollers; chutes; hoppers; gussets; fins; guide rails.

AVAILABLE FROM STOCK: ¼" to 2" widths, 18 yd. and 36 yd. rolls and 12" widths on liner by lineal yd. Special roll widths slit to order. Sold through distributors.

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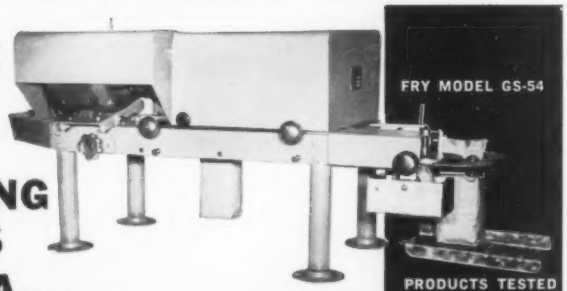
SOLVE YOUR BAG CLOSING NEEDS WITH A...



FRY MODEL GS-54

FRY machine

Model GS-54 — Continuous motion Master Bag Closer. Heat seals, glues or both. Extra strong, sift-proof closures on plain, coated or lined paper bags.

Model CBS—Single or double folds and heat seals many heat sealable paper bags.

Model CBG—Makes flat top bag closure as for coffee bag. Automatic operation. Heat seals, folds, glues.

Tommy Tucker—Feeder for CBG. Fully automatic from filler to shipping case. Tucks gussets.

Model V-30 — Vibrating conveyor to settle product. Will feed Tommy Tucker. Adjustable lengths.

Model CSG—Sealer—gluer for automatic, square and flat paper bags. Handles to 20 lbs.

Free literature available on all Fry Machines.

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- Rice
- Seed
- Sugar
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GEORGE H. FRY COMPANY

42 East Second Street, Mineola, N. Y. — Pioneer 6-6230

118—Table-Top Conveyor

Information sheets, including detailed mechanical drawings, are available on Series TC table-top chain conveyors and turntables used in conjunction with them. Chain widths are from 3¼ to 7½ in. and standard units are driven at 20 to 80 ft./min. For further information, write: Conveyor Specialty Co., Inc., Dept. PE, 33 Newport Ave., North Quincy 71, Mass., or **circle number.**

119—Plastic Liners

Information on the uses, types, and handling of plastic drum and carton liners is provided in a 16-page, illustrated bulletin. It contains charts indicating where liners may be used, what sizes to use, and various films adaptable as liners. For further information, write: Protective Lining Corp., Dept. PE, Woodhull St., Brooklyn 31, N. Y., or **circle number.**

120—Labeling Costs

A booklet, "Reduce Carton Content and Product Identification Costs as Much as 90%," has been published. It illustrates and explains a low-cost method for custom printing labels and tags on-the-spot, complete with product information. For further information, write: Weber Marking Systems, Inc., Dept. PE, Weber Industrial Park, Mount Prospect, Ill., or **circle number.**

121—Polyethylene Bag Bead Sealer

Data sheets provide descriptive information about a polyethylene bag bead sealer. After trimming bag top prior to sealing, closure is made by fusing bag top close to contents of bag. Unit is applicable for textiles, produce, or products requiring a complete seal. For further information, write: Doughboy Industries, Inc., Dept. PE, New Richmond, Wis., or **circle number.**

122—Molded Cushioning Paper

A 16-page illustrated booklet tells of Schocksorb, a molded cushioning paper. Advantages and comparative costs are described for packaging drugs, cosmetics, instruments, metallic finishes, furniture, etc. For further information, write: Kieffer Paper Mills, Dept. PE, Brownstown, Ind., or **circle number.**

123—Flexible Packaging Machinery

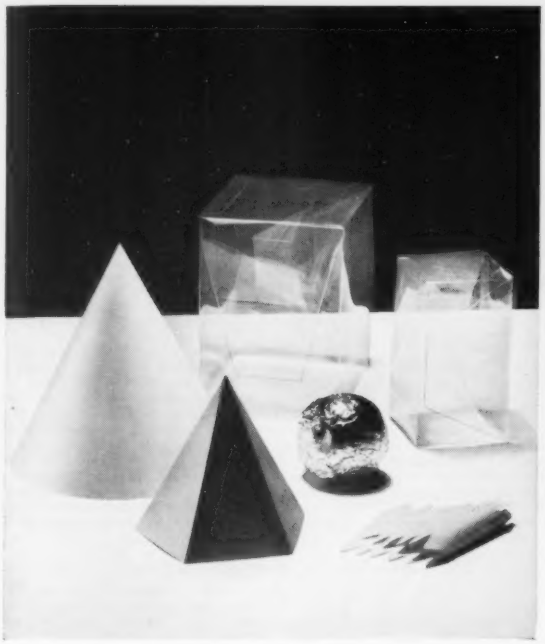
Describing its line of filling and sealing machines which handle flexible packaging materials, a 6-page illustrated brochure is being offered. Units include a form-fill-seal machine, a strip packager, drum liner, pouch maker-sealer, saddle label sealer, as well as foot-operated and hand-operated sealing machines. For further information, write: Mercury Heat Sealing Equipment Co., Dept. PE, 2601 N. Howard St., Philadelphia 33, Pa., or **circle number.**

124—Bottle Feeders/Cleaners

Equipment which air cleans odd-shaped or conventional containers and feeds them directly to a filler is illustrated in a 4-page folder. Also included is a bottle feeder which features adjustable speed control, easy changeover to various sizes of containers, and a combination tilt and stationary dump-tray for safe unloading of empties. For further information, write: Machinery Service Co., Dept. PE, 214 Eiler Ave., Louisville 14, Ky., or **circle number.**

125—Cartoning Machines

Various types of packaging machinery are described in an 8-page catalog, including equipment for Peters' style carton forming and lining, carton fold-



If you package with papers, foils, films—even fabrics—

tissue may do the job for less!

Crystal makes tissues that can be handled, printed, sealed—do most anything costlier papers, foils, films or fabrics can do. Think about your current packaging problem. Remember that Crystal tissues are now used across industry because they can be stitched or twisted or laminated or impregnated or what have you. Now—send the coupon for technical information or write if you have a special question.

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First name in tissues for over 60 years

The Crystal Tissue Company, Middletown, Ohio

I want samples and more information on Crystal Tissues for special applications. PE-760

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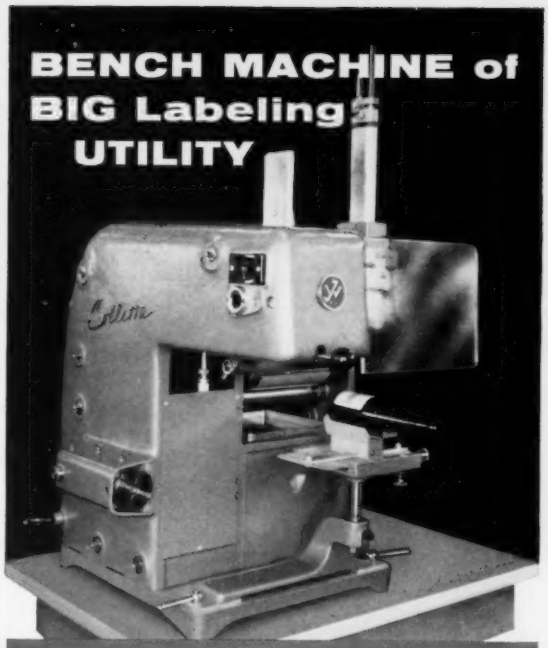

Colletta makes possible money saving mechanical labeling on short runs. Works on proven labeling system with full surface gluing and micro-glue adjustment. No glue smearing. Hair line register. Handles stiff glues and synthetic adhesives equally well.

Operation change-over and setting up is simple and fool proof. No special skill needed. Readily converted to fully automatic through use of easily fitted attachments. Changes from one size or shape of container to another take less than 5 minutes. Almost unlimited versatility, up to one gallon size. Send today for complete information. Use coupon.

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Pneumatic Scale Corp., Ltd.
77 Newport Avenue, Quincy 71, Mass. *Branches, Chicago and New York*

Please send us complete information on Colletta Labelers.

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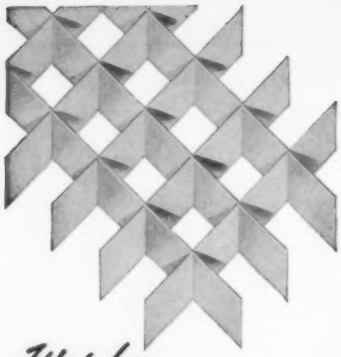

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ing and closing, and carton and tray forming and gluing. Carton sizes, machine specifications, and installation floor plans are presented. These machines range from 30 to 175 or more cartons/min. For further information, write: Peters Machinery Co., Dept. PE, 4700 Ravenswood Ave., Chicago 40, Ill., or **circle number.**

126—Pressure-Sensitive Products

Containing samples and specifications of the Stixie line of pressure-sensitive products, a sales aid and price list jacket is being offered. For further information, write: Coated Products, Inc., Dept. PE, 275 Lincoln Blvd., Middlesex, N. J., or **circle number.**

127—Polyethylene-Wax Coatings

A technical data bulletin, "Low Molecular Weight Polyethylene-Wax Coatings for Corrugated Board," has been released. This type of polyethylene, when blended with paraffin wax and applied to corrugated board, improves scuff and grease resistance and release properties. Bulletin describes characteristics of polyethylene-blended coatings, enumerating the results of tests for hardness, blocking point, chemical resistance, etc. For further information, write: Semet-Solvay Petrochemical Div., Allied Chemical Corp., Dept. PE, 40 Rector St., New York 6, N. Y., or **circle number.**

128—Overload Release Clutch

Bulletin No. 304 illustrates and describes the operation of the Trig-O-Matic overload release clutch. Its trigger action disconnects the load when an overload occurs on the packaging line. When the clutch is reset, the packaging machine resumes operation at the cycle point at which it was released. For further information, write: Centric Clutch Co., Dept. PE, P.O. Box 175, U.S. Rt. 9 at Main St., Woodbridge, N. J., or **circle number.**

129—Portable Counter-Batcher

The electronics products division of this company is distributing a bulletin on its high-speed, automatic counter-batcher, Model FCB-1. Adaptable to small parts, tablets, hardware, and other similar items, this portable machine counts up to 5,000 parts/sec. For further information, write: Post Machinery Co., Dept. PE, 163 Elliott St., Beverly, Mass., or **circle number.**

130—Heat Sealer

An illustrated brochure describes the Rotor-Sealer. Used in heat sealing thermoplastic materials through a heated metal band, this machine is available in three models. It features forced-water cooling, a thermostat range to 600°F., and the unit operates at speeds up to 315 in./ min. Sealing widths available are ⅛, ½, and ¾ in. For further information, write: Ralph Chaffee & Co., Dept. PE, 2358 Market St., San Francisco 14, Cal., or **circle number.**

131—Volumetric Fillers

Catalog sheets, presented in a file folder, describe a line of volumetric fillers for filling liquids into bottles, jars, and cans; a line of tube fillers for filling creams and liquids into tubes; and a line of filler, closure, crimper, and ejector machines for filling pastes, creams, or liquids into tubes, bottles, jars, or cans. For further information, write: Arthur Colton Co., Dept. PE, 3400 E. Lafayete Ave., Detroit 7, Mich., or **circle number.** *(Next Page)*

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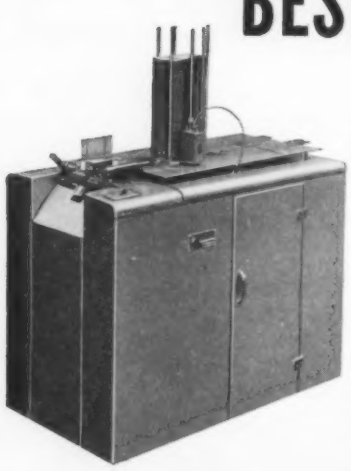

for speeds up to 75 cartons per minute, this semi-automatic time-saver cuts hand-cartoning costs 70%. Still only $2675.

MODEL 50 TUCK-O-MAT

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2431 DALLAS ST., LOS ANGELES 31, CALIF.
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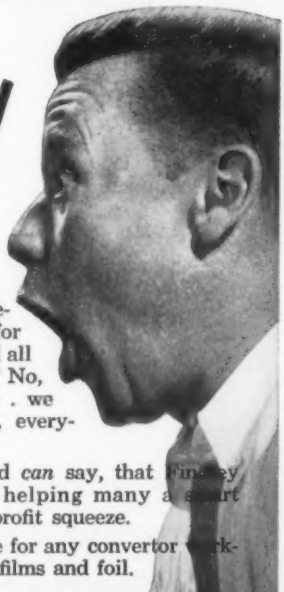
WOW!



HERE'S ONE THAT'S *NOT* BEST!

Make the "best" adhesives in the world for all carton making and all forming operations? No, we can't say that . . . we don't know. Besides, everybody says that.

But we *do* know, and *can* say, that Findley resin adhesives are helping many a smart operator out of the profit squeeze.

They can do the same for any convertor working with paperboard, films and foil.

PUT "WOW" INTO YOUR PROFITS with

Findley's INDUSTRIAL ADHESIVES exclusively

Dept. P.E., Milwaukee 45, Wisconsin

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132—Reinforced Gummed Tape

A Fortisan reinforced tape used in carton sealing, called Snaketape, is the subject of a 4-page folder. Illustrations show advantages claimed for the tape in addition to various uses. For further information, write: Ludlow Papers, Inc., Dept. PE-164, Needham Heights, Mass., or **circle number.**

133—Tape And Label Dispensers

A brochure is available which illustrates a number of tape and label dispensers, including electric and manual machines, that handle kraft, reinforced, gummed, and pressure-sensitive tapes. In addition, it shows Dispens-A-Ply pressure-sensitive labeler, coding attachments, and a polyethylene bag sealer for poultry and produce. For further information, write: Derby Sealers, Inc., Dept. PE, Derby, Conn., or **circle number.**

134—Polyethylene Technical Data

Technical information is provided in an 18-page booklet on the physical and chemical properties, pigmentation, and applications of Marlex polyethylene. For further information, write: Phillips Chemical Co., Plastics Div., Dept. PE, Bartlesville, Okla., or **circle number.**

135—Conveyor Chain

An illustrated brochure is being offered to show the features of a conveyor chain for automated packaging operations for foods and beverages. Chain permits use of wire supporting rails for greater distribution of load. For further information, write: Diamond Chain Co., Inc., Dept. PE, 402 Kentucky Ave., Indianapolis 7, Ind., or **circle number.**

136—Packaging Odd Shapes

Packmaster Model 56 is described in a 4-page folder, PS6-1. The unit packages long, irregularly-shaped parts by using soft, sponge-rubber sealing rollers which make the cohesive paper conform to the parts. Machine packages pieces from ¼ to 2 in. thick using paper up to 24 in. wide. For further information, write: Sundstrand-American Broach Div., Sundstrand Corp., Dept. PE, Ann Arbor, Mich., or **circle number.**

137—Collapsible Tube Reference

A 6-page reference has been published for selecting and specifying collapsible tubes, plastic closures, and custom-molded tips and caps. It also includes illustrations and a stocksize table for general purpose closures. For further information, write: Wheeling Stamping Co., Dept. PE, Wheeling, W. Va., **or circle number.**

138—Packaging Adhesives

A booklet has been prepared which outlines a wide variety of adhesives offered by this company. Brief descriptions of different packaging applications are also provided. For further information, write: Swift & Co., Adhesive Products Dept., Dept. PE, Chicago 9, Ill., or **circle number.**

139—Bag Packers

Picturing and describing the Vibrox line of bag packers, a 4-page brochure is obtainable. These mechanical action packers impart a rapid vibrating or settling motion to cotton, burlap, paper bags, or other dry bulk materials as they are filled so that smaller containers may be used. For further information, write: B. F. Gump Co., Dept. PE, 1346 S. Cicero Ave., Chicago 50, Ill., or **circle number.**

140—Cellulose Bands

Questions and answers about Cel-O-Seal cellulose bands appear in a booklet. Topics covered include cost, application, and point-of-sale merchandising opportunities offered. For further information, write: E. I. du Pont de Nemours & Co. (Inc.), Film Dept., Dept. PE, Wilmington 98, Del., or **circle number.**

141—Packaging Knives

For use in packaging and other industrial applications, a line of knives is discussed in an illustrated folder. Shapes and composition of these knives are considered as well as applications. For further information, write: Coes Knife Co., Dept. PE, 62 Coes St., Worcester, Mass., or **circle number.**

142—Vibratory Feeders

Information is offered on a line of heavy-duty, electromagnetic vibratory feeders especially designed for high-capacity feeding where installation space is limited. Feeding capacities range from 25 to more than 1,000 tons/hr. in dry materials weighing approximately 100 lb./cu. ft. For further information, write: Syntron Co., Dept. PE, 269 Lexington Ave., Homer City, Pa., or **circle number.**

143—Cushioned Bags

To tell about Jet-Pak cushioned and insulated shipping bags, literature is being offered. It includes a description of the bag's construction, a list of the 14 available sizes, and points out how they may be used to ship books, machine and electronic parts, etc. For further information, write: Columbian Rope Co., Packaging Div., Dept. PE, Auburn, N.Y., or **circle number.**

144—Polystyrene Film

Available is a 4-page brochure which includes a detailed chart listing the physical and chemical characteristics of Trycite, a low-cost polystyrene film. The film is suitable for self-service applications such as food stuffs, soft goods, stationery, etc. For further information, write: The Dobeckmun Co., Div. of Dow Chemical Co., Dept. PE, Cleveland 1, Ohio, or **circle number.**

145—Cartoner

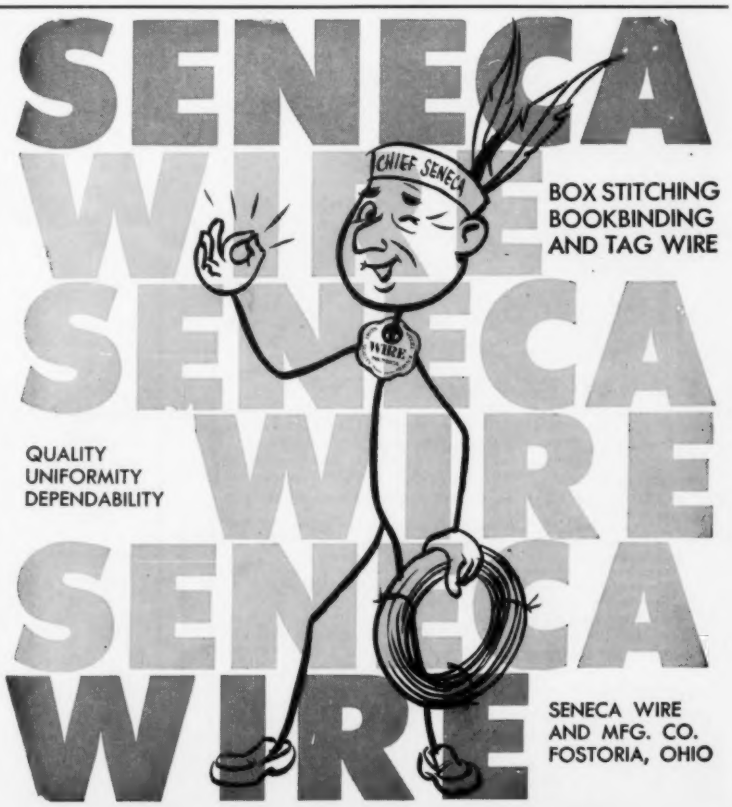
A bulletin has been prepared to describe the C-24 cartoner which operates at a speed of 60 cartons/min. in the ¼ to ½ lb. range. Carton sizes of 6x2x3¾ in. to 7x3½x1 in. can be handled on this 1-operator machine. For further information, write: U.S. Automatic Box Machinery Co., Dept. PE, 98 Arboretum Rd., Roslindale, Boston 31, Mass., or **circle number.**

146—Specialty Inks

A folder explains the basic types and varieties of inks available from this company for marking and imprinting. Its "touch-dry" ink facilitates high-speed production with such materials as polyethylene, cellophane, and wax coatings. For further information, write: Markem Machine Co., Dept. PE, Keene 35, N.H., or **circle number.**

147—Conversion Table

A wallet-sized reference table for converting the bag/min. rate of filled multiwall bags to tons/hr. is obtainable. It lists the ton/hr. rate of from 1 to 30 bags/min., for 100-, 80-, and 50-lb. bags. For further information, write: St. Regis Paper Co., Container Div., Dept. PE, 150 E. 42nd St., New York 17, N. Y., or **circle number.** *(Turn Page)*



148—Carton Filler And Sealer

Operating details and specifications are given in a brochure for the Flexi-Matic carton filler and sealer. Recommended for plants filling 4,000 or more cartons/day, the unit forms the carton, seals the bottom, fills and shakes it, seals the top, and passes it through a compression dryer. For further information, write: Triangle Package Machinery Co., Dept. PE, 6631 W. Diversey Ave., Chicago 35, Ill., or **circle number.**

149—Electric Temperature Controls

A 4-page descriptive bulletin has specifications for various types of differential expansion Thermoswitch controls which cover a range of temperatures. A variety of sizes are discussed as well as electronic, mechanical, and thermistor indicating controllers. For further information, write: Fenwal, Inc., Dept. PE, 113 Pleasant St., Ashland, Mass., or **circle number.**

150—Paper, Chipboard Partitions

A 4-page brochure pictures a variety of paper and chipboard partitions and die-cuts. Special designs are available for machine parts, electronic and automotive parts, pharmaceuticals, etc. For further information, write: W. J. Bradford Paper Co., Dept. PE, 301 W. 16th St., Holland, Mich., or **circle number.**

151—Rotary Vacuum Filler

A 16-page catalog gives detailed specifications for a rotary vacuum filler, available in 14 adaptations of 6 basic models. Equipment is designed to handle liquids and semi-liquids at 12 to 300 containers/min. For further information, write: U.S. Bottlers Machinery Co., Dept. PE, 4009 N. Rockwell St., Chicago 18, Ill., or **circle number.**

152—Cellulose Wadding

Varieties of cellulose wadding material are illustrated in an 8-page pamphlet. Regular types of this Cel-Fibe wadding include bleached and unbleached, facial tissue quality, moisture-absorbent or -resistant, and wet-strength. Applications in handling, shipping, storing, converting, and manufacturing are shown. For further information, write: Cel-Fibe Div., Personal Products Corp., Dept. PE, Milltown, N.J., or **circle number.**

153—Packaging Abstracts

PACKAGE ENGINEERING magazine is offering a 4-page illustrated brochure describing **"Packaging Abstracts,"** a monthly service which abstracts articles about packaging from some 200 magazines from all over the world. Each issue is divided into 18 sections of topics pertaining to raw materials, adhesives, coating treatments, shipping containers, etc. For further information, write: Angus J. Ray Publishing Co., Dept. PE, 185 N. Wabash, Chicago 1, Ill., or **circle number.**

154—Box Making Machine

The Rite-Size box machine is described in a brochure being offered. The unit is designed to produce, from corrugated sheets, a wide variety of styles and sizes of shipping containers, plus pads and liners. Diagrams suggest floor plans for setting up a box-making department. For further information, write: Colt Packaging Machinery Co., Dept. PE, 53 Washington Ave., Cranston 7, R.I., or **circle number.**

155—Cushioning Material

An illustrated leaflet describes Sus-Rap inner packaging material for cushioning such items as radios, electric motors, foils and films, paper stock, glass, and delicate mechanisms. For further information, write: Vanant Co., Inc., Dept. PE, 955 S. Water St., Milwaukee 4, Wis., or **circle number.**

156—Gallon-A-Stroke Filler

Model G-59, a 2-line, piston-type filling machine is discussed in a bulletin. At a gallon a stroke, it fills from 20 to 40 gal./min. with liquid, semi-liquid, and semi-solid products. It operates by the bottom-up method and features a "no jar, no fill" device. For further information, write: The Filler machine Co., Dept. PE, 10 Penn Ave., Rockledge, Philadelphia 11, Pa., or **circle number.**

157—Flame-Proof Barrier

Pyro-Kure, a barrier material with flame extinguishing properties, is described in a brochure. Nontoxic and noncorrosive to metals, the material releases a gas that tends to smother flames when surrounding temperatures reach combustion level. For further information, write: American Sisalkraft Corp., Dept. PE, Attleboro, Mass., or **circle number.**

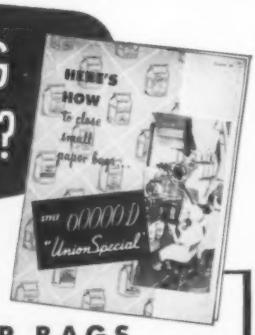
158—Gummed Tape Sealer

A 4-page illustrated folder is available on Better Pack 555, an electric gummed tape sealer with length selector scale ranging from 6 to 36 in. or from 15 to 45 in. Unit also has a non-measuring hold key for smaller or greater lengths. For further information, write: Better Packages, Inc., Dept. PE, 253 Canal St., Shelton, Conn., or **circle number.**

159—Corrugated Boxes

A pamphlet has been developed to explain two services offered by this com-

PACKAGING PROBLEMS?



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pany to users of corrugated boxes. Benefits and descriptions are presented on its product development and engineering laboratory and the services of the National Safe Transit Program testing procedures. For further information, write: Hoerner Boxes, Inc., Dept. PE, 600 Morgan St., Keokuk, Ia., or **circle number.**

160—Marking Attachment

Bulletin ROL-3 contains illustrations, descriptions, and specifications of Rolacoder friction-type case-marking and coding attachment in the redesigned Series 300 machines. For further information, write: Adolph Gottscho, Inc., Dept. PE, Hillside 5, N.J., or **circle number.**

161—Grease And Oil Repellent

Pamphlet Y-1PB(89.15)K provides information on Scotchgard brand grease and oil repellent. The coating may be applied to materials such as asphalt laminates, wax-coated paper and board, corrugated boxes, envelopes, and multiwall bags. For further information, write: Minnesota Mining and Manufacturing Co., Chemical Div., Dept. PE, 900 Bush Ave., St. Paul 6, Minn., or **circle number.**

162—Bag Closer

Details about a portable bag closer are given in a 4-page pamphlet. The unit weighs 10½ lb., requires no installation, and handles both textile and paper bags with a stitch range of 4 to 5½ stitches/in. For further information, write: Dave Fischbein Co., Dept. PE, 2730 Thirtieth Ave. S., Minneapolis, Minn., or **circle number.**

163—Silicone Fibrous Cushioning

A data sheet presents information on silicone rubber fibrous mats which are said to possess qualities superior to those of silicone sponge and foam. Among its properties are low compression set, tear resistance, and tensile strength. For further information, write: Connecticut Hard Rubber Co., Dept. PE, New Haven 9, Conn., or **circle number.**

164—Container Handling Equipment

Bulletin ST-1 lists specifications for a variety of straight line and rotary unscrambling tables, accumulating tables, lateral curve conveyors, and special purpose conveyors. The equipment is designed to handle bottles, jars, and cans. For further information, write: Island Equipment Corp., Dept. PE, P.O. Box 38-276, Miami 38, Fla., or **circle number.**

165—Gumming Equipment

To describe its complete line of gumming equipment, a 6-page folder is being offered. These units include table models and automatic machines for spot and strip gumming and may be used for labeling, lining, and case marking. For further information, write: New Jersey Machine Corp., Dept. PE, 16th and Willow Ave., Hoboken, N.J., or **circle number.**

166—Packaging Adhesives

A booklet, "How to Buy Adhesives for Better Adhesion," offers 23 yardsticks for selecting the right adhesive for a particular application. For further information, write: Arabol Manufacturing Co., Dept. PE, 110 E. 42nd St., New York 17, N.Y., or **circle number.**

167—Bursting Strength Tester

Seven different models of the Mullen Tester are listed on an information sheet. The instrument is used to determine the lb./sq. in. bursting strength of sheet materials such as paper, corrugated, solid fibreboard, and plastic films. Pressures up to 2,500 lb./sq. in. can be measured. For further information, write: B. F. Perkins and Son, Inc., Tester Div., Dept. PE, Box 388, Holyoke, Mass., or **circle number.**

168—Accumulator And Bundler

An illustrated bulletin is available telling how savings can be effected by bundling unit packages together in film or paper wraps. Labeling and imprinting units are available for use with this bundling equipment. For further information, write: Hayssen Manufacturing Co., Dept. PE-119, Sheboygan, Wis., or **circle number.**

169—Counting and Imprinting Unit

Two pieces of literature are available on the Tickometer, a machine designed for automatically counting, dating, coding, and imprinting labels, tags, cartons, etc. at speeds from 500 to 1,000 pieces/min. For further information, write: Pitney-Bowes, Inc., Dept. PE, 7734 Walnut St., Stamford, Conn., or **circle number.**

170—Formed Plastic Containers

The merits of Polyflex-formed containers are illustrated in a pamphlet. The material is an extruded polystyrene that is clear, nontoxic, odorless, tasteless, water and grease proof, and resists a range of temperatures from sub-zero to 175°F. For further information, write: Plax Corp., Dept. PE, Hartford 1, Conn., or **circle number.**

171—Water-Soluble Film

Prepared by the plastics division, 3 data sheets describe characteristics, applications, and machinability of polyvinyl alcohol film which is water soluble. For use with water-additive products, material is specifically designed for form-and-fill packaging machines and a list of such equipment is provided. For further information, write: Reynolds Metals Co., Dept. PE, Richmond 18, Va., or **circle number.**

172—Urea Molding Compounds

A 5-page technical report provides data on Bettle urea molding compounds—urea formaldehyde resin and highly refined alpha cellulose. Physical, chemical, and electrical properties are disclosed. For further information, write: American Cyanamid Co., Plastics & Resins Div., Dept. PE, 30 Rockefeller Plaza, New York 20, N.Y., or **circle number.**

173—Automatic Wrapper

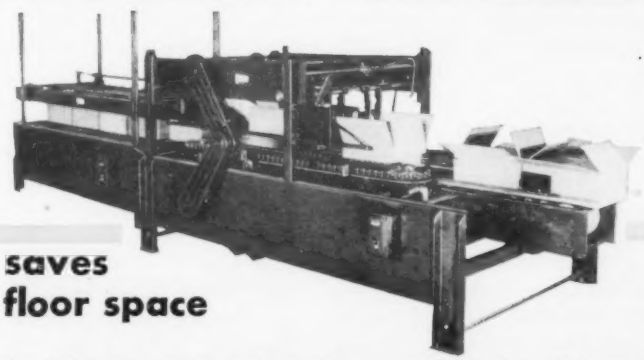
A 12-page catalog is being offered on the Campbell wrapper, an automatic machine handling all types of wrap materials, tube forming them around the product. The unit then crimps, cuts, heat or glue seals, folds, and delivers the product. For further information, write: Hudson-Sharp Machine Co., Dept. PE, 1201 Main St., Green Bay, Wis., or **circle number.**

174—Rubberized Hair Cushioning

Hairflex cushioning products are described in an 8-page pamphlet. This resilient, lightweight material is said to be resistant to moisture and fungus, is non-abrading, durable, and the packs and molds are reusable. For further information, write: Armour Alliance Industries, Cushioning Products Div., Dept. PE, 16123 Armour St., N.E., Alliance, Ohio, or **circle number.**

(End)

A-B-C Short Case Sealer



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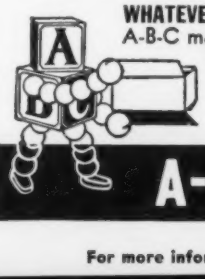

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Structural design notes for corrugated containers

Note No. 18: Stacking strength of boxes—Part II

By K. Q. Kellicutt,
Engineer, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, Madison, Wisconsin

Introduction. As explained in Note 17 *(2)*, there is a relationship between the inherent compressive strength of a fibreboard box and the length of time the box can sustain a specific dead load without collapse. The length of time is dependent upon the proportion of the compressive strength of the box, as determined in a compression testing machine, required to carry the dead load. Depending upon the proportion, these durations may be only a matter of minutes or they could extend for several years.

It was also pointed out in Note 17 that several factors, such as handling before storage and increases in moisture content of boxes, have a deleterious effect on their compressive strength and, in turn, on their stacking life. The effect of moisture on compressive strength has been discussed *(1)*, but it is difficult, if not impossible, to evaluate the reductions in strength that result from the several handlings a box receives before being placed in storage.

EFFECTS OF ROUGH HANDLING

But, because a box may be damaged during handling, even though the damage is not always obvious, consideration should be taken of this fact in applying stacking height limits.

Damage Resulting From Compression

A corrugated box can actually withstand considerable rough usage without appreciable loss of strength. For example, in some recent compression tests of A-flute corrugated boxes, the average maximum compressive strength of the boxes was found to be 1,686 lb. The average deflection corresponding to that load was found to be 0.840 in.

In order to determine the extent of damage to a box, which results from repeated fixed deflections that are less than the deflection at maximum load, two additional sets of boxes were compression tested. These two sets were taken from the same lot as those of the tests just mentioned. Each set consisted of ten boxes that were subjected to cyclic loading in a testing machine.

The loading cycle for one lot consisted of loading each box in the lot to an extent that 0.400-in. deflection was attained. When the fixed deflection was reached, the compression machine was reversed and the box was gradually unloaded until no load was on the container. The cycle was repeated five times. On the sixth cycle, the load was continuously applied until the box failed. At that point, maximum load and the corresponding deflection of the box were recorded.

The same procedure was employed for the second set except the limits of deflection for the cyclic loading were established between 0 and 0.600 in.

The average maximum load for the set of boxes that were cycled to a deflection of 0.400 in. was found to be 1,745 lb., and the average deflection at maximum load was 0.762 in. These two values correspond to those obtained in the initial tests.

For the set of boxes that were cycled to a deflection of 0.600 in. five times before continuing the test to failure, the average maximum load obtained was 1,766 lb. and the deflection at maximum load was 0.780 in. Here again, the values of maximum load are similar to those found in the initial tests.

The significant point of this experiment is the fact that boxes can withstand a certain amount of compression without any loss in strength, but if the box is subjected to a crushing load that produces a deflection corresponding to that attained at its maximum load, almost all of its stiffness will be lost. In the event that this condition has occurred, it is generally apparent due to the crushed and rolled areas adjacent to the top and bottom horizontal scores. Also, hairline creases radiating from the corners of the side and end panels indicate the panels have buckled. A box with such markings should not be expected to sustain a stacking load in storage.

Damage Caused By Crushed Areas

The basic principle on which bending stiffness is attained in a structural material, such as corrugated fibreboard, is the arrangement and spacing of the component paperboard sheets from which it is made. The primary function of the corrugated section is to space the liners properly and re-

tain the spacing after the material is formed into a box.

Factors in use, that reduce the spacing, or thickness of the board, also reduce the compressive strength of the box. The amount of reduction in strength is mainly dependent upon the size and location of the areas that have been reduced in thickness, or crushed. For example, crushed areas have little or no effect on the strength of the box when they occur in the top and bottom flaps of a box that is stacked in such a way that the dead load is applied in the top-to-bottom direction.

The reason for this is, of course, obvious in that the dead load of the stack is distributed over the side and end panels of the box, the top and bottom flaps only helping to hold these panels in the appropriate vertical position. Also, dependent upon location, small areas may be crushed in the side and end panels without appreciable effect on compressive strength.

The crushed areas will have the least effect on strength when they are located in the center of an end or side panel. In fact, it is actually possible to remove a small amount of material from the center of each of the four panels without reducing the strength very much.

This was found to be true in a study designed to determine the effect of ventilating holes and handholes on compressive strength of fibreboard boxes *(3)*. It was also found in the study that, when any material was removed from a box for the purpose of making ventilating and handholes, cutouts made close to one of the box edges had an adverse effect on compressive strength. This was especially true if the vertical edges were involved.

The vertical edges of the box are extremely important because much of the compressive strength of the box comes from them. A close examination of the box in the illustration shows their function as stiffeners or load carriers. The box in the photograph was made of double-wall corrugated and had sustained a dead load of 945 lb. for 440 days when photographed.

After the test had been in progress for a few weeks, the four vertical panels of the box gradually started to bow inward. The bowing continued throughout the duration of the test. The corners, or vertical edges, moved very little and remained rigidly fixed in their resistance to the crushing load.

Close examination of the photograph reveals many lines of concentrated stress radiating from the corners of each panel. As the stress lines developed and became more obvious, with the increasing number of fine line folds, a vertical fold developed in the outer liner. This fold developed near the front left edge and weakened it. Eventually the edge buckled, and the box collapsed at the end of 468 days.

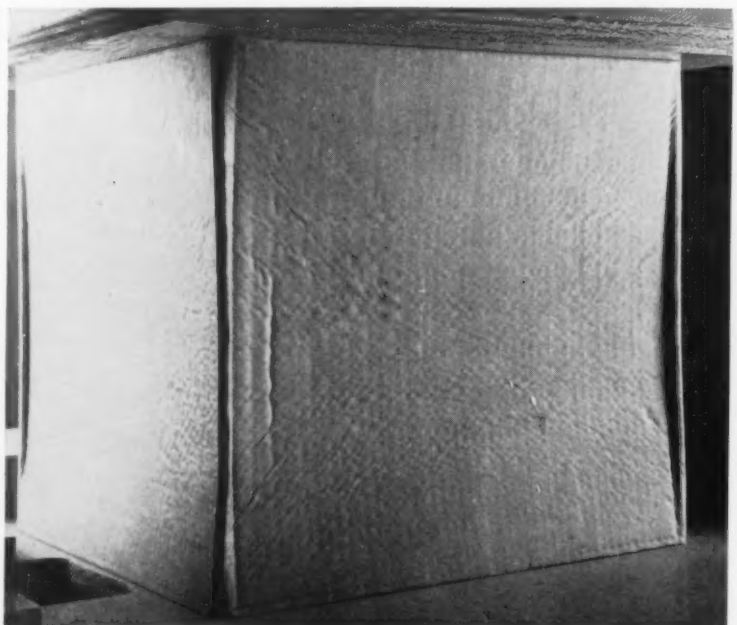
The reactions of this particular box were more ideal than average, because ordinarily all four panels of the box do not bow inward. Generally, one or two of the panels bow outward, causing failure at a shorter duration. This would probably be the most likely condition in service, as the contents of the box would prevent all panels from bowing inward.

APPLICATION OF DATA

Knowing the testing machine compressive strength value for a specific kind of box under a specific condition of moisture, the curve included as Fig. 2 of Note 17 *(2)* can be used as a guide in determining the dead load and the length of time a box can sustain it in storage. Before using this curve, however, the machine-test load of the box must be reduced.

As moisture content of the fibreboard is one of the worst factors of use to contend with, stacking operations should be planned for the highest moisture conditions contemplated. This means reducing the compressive strength of the box to the appropriate value. The reduction can be made from the chart in Fig. 2 of Note 13 *(1)*.

Further reductions need to be made to allow for rough handling. There is, of course, no guide to follow in making a reduction in strength for the rough handling the box has encountered in han-



EMPTY DOUBLE-WALL CORRUGATED BOX had sustained dead load of 945 lb. for 440 days when this photograph was taken. Still rigid vertical edges are clearly visible. Close examination shows many lines of concentrated stress radiating from corners of each panel.

dling prior to storage. Therefore, the magnitude of these reductions is dependent upon judgment, experience, and risk.

Literature Cited

(1) Kellicutt, K. Q., "Note No. 13: Compressive strength of boxes—Part III," PACKAGE ENGINEERING **5** (1960), No. 2 (Feb.), p. 94.

(2) Kellicutt, K. Q., "Note No. 17: Stacking strength of boxes—Part I," PACKAGE ENGINEERING **5** (1960), No. 6 (June), p. 124.

(3) Peters, C. C. and Kellicutt, K. Q., *Effect of Ventilating and Handholes on Compressive Strength of Fibreboard Boxes* (Madison, Wis.: Forest Products Laboratory), Report No. 2152, Aug., 1959.

(End)

Split-level packaging line

(Continued from Page 40)

ceiling of the basement. The infeed conveyor chain and feed mechanism are attached to the I-beam at the bottom. The discharge mechanism at the top of the conveyor chain feeds into the packaging line. All of this equipment gets its power from the drive unit in the basement.

There is a continuous chain moving in between these stations. The lugs or fingers are 6 in. apart. The spacing between them could be increased or lessened should any particular container size require it. These fingers are simply pieces of metal attached to the chain which, itself, is basically standard.

The packaging line the elevator serves runs at 120 bottles/min., but experimentally, we have delivered 200/min. on this elevator. Our present needs have made it unnecessary to explore further the upper speed limits of this equipment.

Using Star Wheels

In our operation, we start with a standard rotary unscrambler. Stock handlers unload cases of bottles onto this unscrambler which, in turn, transfers these bottles to a tabletop chain. This is the infeed to the star wheel at the lower end of the elevator. The star wheel is timed to the lifting fingers of the chain so that each bottle is transferred smoothly from a lateral direction to a vertical one. The major problem here was in the very critical timing required and not in the star wheel itself.

Upstairs, we faced another and more difficult problem. The discharge star wheel demanded an entirely different type of design. Accompanying photos show the points of difference between the lower-level and upper-level star wheels. Basically, it was a question of wheel design suitable for the discharge operation. We had to redesign the throat of the mechanism to coordinate with the infeed of the line.

Once the bottles move from the unscrambler and conveyor to the elevator, they go upward, then transfer out of the elevator. Next, they go into a Pneumatic Scale air cleaner, filler, capper, and a New Jersey labeler.

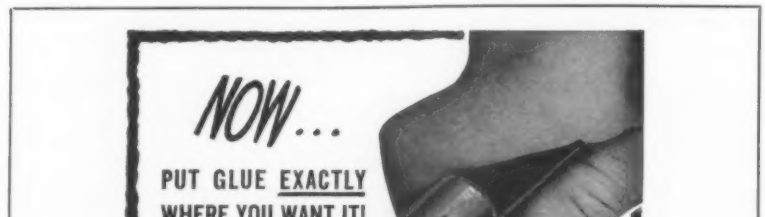
Focal Point Of Control

The elevator is automatically controlled by a Micro Switch on the infeed of the air cleaner. As a result, the elevator supplies bottles on demand and operates intermittently as the needs of the rest of the packaging line may require, controlled by the air cleaner.

Our operator runs the entire line from a switch panel in the center of the U-shaped line. All machines in the line are wired into this central control panel. The operator is a qualified production machine operator which, incidentally, is a distinct job category within our organization. This central control is just as important as the central drive in an operation such as we have. By having just one drive mechanism, all moving parts are driven from it which involves an arrangement of gear trains and other related mechanisms.

Effective as this operation is at the present time, we anticipate refinements and improvements. For one thing, it is now limited to a range of round bottles up to 4 oz. We believe that we can modify this equipment to handle square or rectangular bottles.

The next step in our operation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involves conveying filled bottles by a downward-moving elevator or lowering device to where the shipping cases are reloaded in the basement. This phase transports the production away from the other open leg of the U-shaped line and moves it downstairs. Experience with alternative conveying machines convinces us that the vertical elevator is the most effective device for our particular needs.

We expect that further experimentation will lead us in this direction. Obviously, packaging projects and operations, such as this, are always in a state of flux; improvements and new concepts are constantly appearing. The main point here is that our present experience with upward elevating of bottles convinced us that we are on the right track in developing a three-dimensional, U-shaped layout. As time and experience permit, we are envisioning effective expansion of this concept to further capitalize on the advantages of a multi-story operation for packaging. *(End)*

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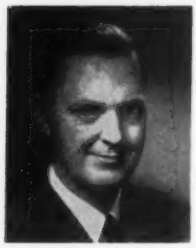
What we think



How $25,000 will get you $200,000 worth of research

In more companies than the respective managements would care to admit, no one is really sure about the best way to handle packaging research. Package users who try to shuck too big a chunk of this onto their suppliers are in for trouble. Their research, thus, will lose a lot of its objectivity. On the other hand, a company well might go too far off the deep end in maintaining its own research facilities.

Many organizations try to reach a compromise. A food company, for example, may decide to limit its own research to food products and get its packaging suppliers to do its packaging research, but the difference between this company and the situation alluded to above is that, in this instance, the food company gives its packaging suppliers extremely limited and sharply focused objectives. In other words, it pinpoints a specific problem and lets the supplier dig into that.

Sharing the burdens cuts costs of research

Solving this research problem often dictates a choice between two alternatives—neither of which is particularly acceptable to management. Fortunately, the end is not yet. A new possibility now looms on the packaging horizon.

Michigan State University's school of packaging is looking for eight sponsors to support a $200,000 research project. For this money, it plans to explore the dynamic mechanical properties of various packaging materials along two lines: (1) evaluating the energy-absorbing properties of cushioning materials and (2) studying the properties of folding boxboards and flexible materials, which affect their use in high-speed package filling and sealing operations.

The school tells us that this research project will take four years and sponsors may pay for their share in installments. Project sponsors will get reports for their exclusive benefit at semi-annual seminars to be held at the University. The University plans to reserve publications rights, but will not exercise these rights until one year after the termination date unless the sponsors as a group decide that they, or the project itself, could benefit from earlier publication.

Another point is that the sponsors can take a hand in guiding the project as the work goes along. All of this makes the project about as close as you can get to do-it-yourself—short of assuming the full cost and burden of maintaining your own facilities.

These researchers are competent, energetic

Dr. James W. Goff, MSU's dedicated and enthusiastic young teacher of packaging will direct the project and will draw on other faculty members and lecturers of the school of packaging as well as from the University at large. He and his research team plan to accomplish a number of specific objectives.

Among others, they expect to develop "G" versus static load data dynamically for commercially available package cushioning materials including corrugated board, plastic foam, and bonded fiber materials. Their object is to develop useful and reliable information as a basis for using cushioning materials with some degree of certainty concerning protection to the product and economy of packaging.

Another major phase of the project is to develop force-time relationships in folding boxboard scores at packaging line operating speeds—for different boards and under varying scoring conditions. This is necessary, Dr. Goff thinks, in developing basic information on which one can predicate scoring specifications—to permit high-speed carton filling with least difficulty.

In short, research work of professional caliber, conducted under university auspices, is available at bargain prices. Anyone questioning this, need only calculate what it would cost his own company to do a comparable job—either starting from scratch or utilizing whatever it has in the way of research people and equipment. All this strikes us as an intelligent concept of pooling, and we expect Michigan State to get its eight sponsors soon.

Bruce Hoffman

Editor

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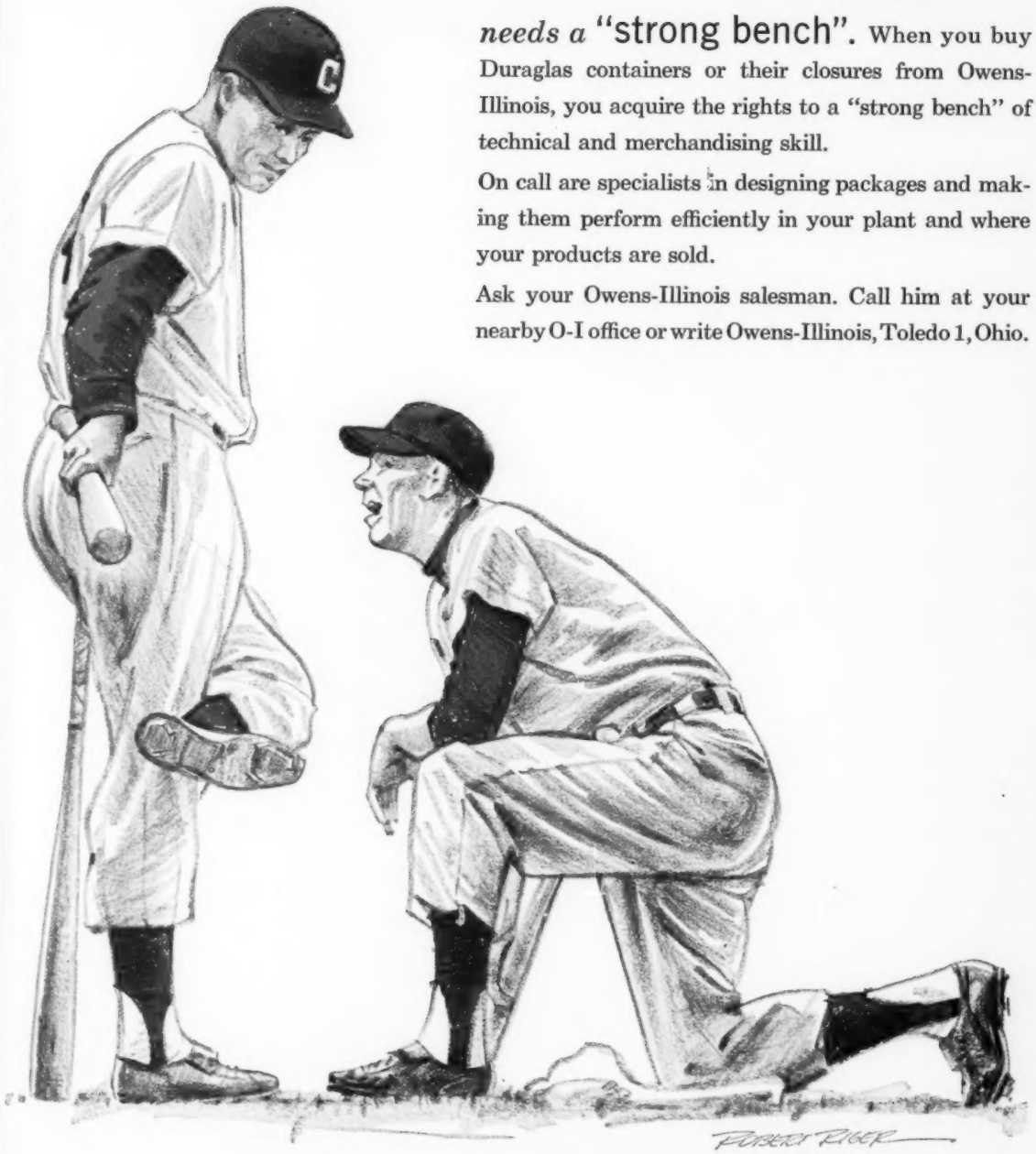

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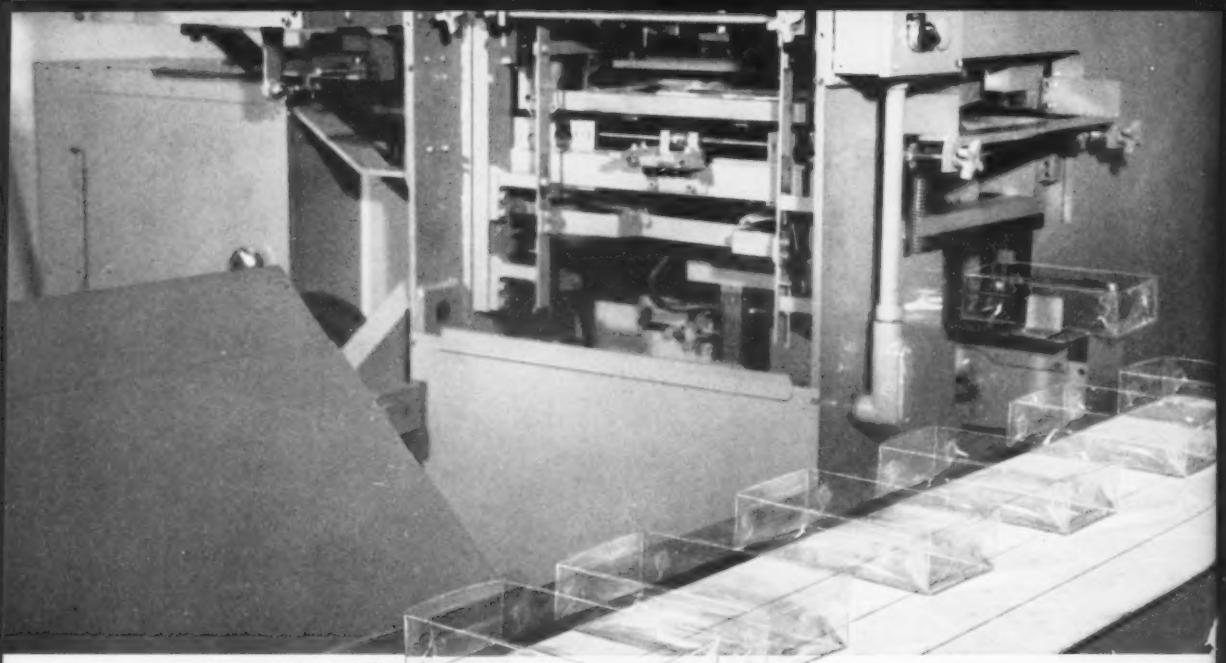

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